L 23848-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) Pad IJP(c) MJW/JD/HW/WB
ACCESSION NR: AT4045673 S/2680/64/000/022/0101/0114

AUTHOR: Nuzhnov, A. G. (Deceased); Pokrovskaya, G. N.; Puchkov, B. I.; Rogel'berg, I.L.; Tarasova, T. F.

TITLE: Investigation of Alumel and Chromel alloys with cobalt additions

SOURCE: Moscow. Gosudarstvenny*y nauchno-issledovatel'skiy i proyektny*y institut splavov i obrabotki tsvetny*kh metallov. Trudy*, no. 22, 1964. Issledovaniye splavov dlya termopar (Studying alloys for thermocouples), 101-114

TOPIC TAGS: Chromel, Alumel, Co, Mn, Ni, Cr, oxidation resistance, thermal emf

ABSTRACT: The decline of the production of Chromel and Alumel couples in

thermoelectromotive force under the effect of oxidation were observed in Ni(N-1), Cr(KhO), Si(Krl), Al(A00) and Mn(Mrl) alloy wire rods having a diameter of 3.2 and 1.2 mm. Co additions were found to lower the thermoelectromotive force of Chromel and Alumel, their thermoelectric properties becoming more linear and appproximating the norms set by State Standards (GOST) 1790-63. (see figs. 1 &

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L 23848-65
ACCESSION NR: AT4045673

2 of enclosure). Therefore, Co is a suitable regulator of the thermoelectric properties of both alloys. Oxidation resistance of Chromel and its working properties were substantially improved and those of Alumel to a lesser extent by Co

electromotive force of couples approximated the norms set by State Standards 3044-61. Orig. art. has: 7 figures and 3 tables

ASSOCIATION: Gosudarstvennyy naucnno-issledovatel'skiy i proyektnyy institut obrabotki tsvetnykh metallov, Moscow (State Scientific Research and Planning Institute for the Processing of Nonferrous Metals)

SUBMITTED: 00 ENCL: 04 SUB CODE: MM, EM

NR REF SOV: 005 OTHER: 001

AUTHOR: Nuzhnov, A. G. (Deceased); Pokrovskaya, O. N.; Puchkov, B. I.; Rogel'berg, I. L.; Tarasova, T. F.

TITLE: Investigation of the effect of the composition of an "CA" alloy on the thermoelectromotive force

SOURCE: Moscow. Gosudarstvenny*y nauchno-issledovatel'skiy i proyektny*y institut splavov i obrabotki tsvetny*kh metallov. Trudy*, no. 22, 1964. Issledovaniye splavov dlya termopar (Studying alloys for thermocouples), 129-142

TOPIC TAGS: aluminum, silicon, manganese, thermoelectromotive force

ABSTRACT: The effect of Si, Al and Mn on the thermoelectromotive force of the Alumel-type alloy "CA" was investigated. Unlike Alumel, the Al contents in the "CA" alloy is higher (up to 3.5%) and the Mn contents lower (less than 2%). All

tests were conducted within a [illegible] temperature range. [illegible]
nents lowered the thermoelectro[illegible]ive force of the tested alloy. The effect of
Mn was found to be independent of the concentration of the two other components.

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L 23849-65
ACCESSION NR: AT4045675

An efficient adjustment of the electromotive force calls for the maintenance of an [illegible] Mn level of 1.4% during the melting of the alloy while Al and Si are

the production process of "CA" alloys. Orig. art. has: 12 figures and 2 tables

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut obrabotki tsvetnykh metallov, Moscow (State Scientific Research and Planning Institute for the Processing of Nonferrous Metals)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM,EM

NR REF SOV: 004 OTHER: 000

Card 2/2

ROGEL'BERG, I.L., inzhener.

"Metals and thermal treatment. Bibliographical guide." M.I.Mishkina, M.A.Raevskaia. Reviewed by I.L.Rogel'berg. Vest.mash. 34 no.3:102-105 Mr '54. (MLRA 7:4)

(Bibliography--Metals) (Metals--Bibliography)
(Mishkina, M.I.) (Raevskaia, M.A.)

KUZ'MIN, Yu.M.; NOVIKOV, I.N.; ROGEL'BERG, I.L.

Changes in mosaic block dimensions during the annealing of cold-rolled nickel. Izv.vys.ucheb.zav.; chern.met. no.3:96-99 '60. (MIRA 13:4)

1. Krasnoyarskiy institut tsvetnykh metallov.
(Nickel--Metallography) (Annealing of metals)

FOGEL 'BERG, I. L.

(Diagrams of the recrystallization of metals and alloys) Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1950. 279 p.

(50-31152)

TN671.R6

S/148/60/000/003/009/018
A161/A029

AUTHORS: Kuz'min, Yu.M.; Novikov, I.N.; Rogel'berg, I.L.

TITLE: Changes of Mosaic Block Dimensions in Cold-Rolled Nickel in Annealing

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. - Chernaya metallurgiya, 1960, No. 3. pp 96 - 99

TEXT: An investigation is described, in which the mean size of mosaic blocks of cold-rolled polycrystalline nickel was measured roentgenographically after annealing at different temperatures. Nickel (99.05 Ni) was remelted and deoxidized by carbon. The composition of obtained ingots was: 0.1%C; 0.022% Fe; 0.003% Cu; 0.001% Mg; 0.004% Si, and below 0.001% Pb, Sn, Sb and Bi (remainder nickel). The ingots were rolled hot, then cold, to 0.8 mm; annealed in salt bath; the surface pickled in undiluted nitric acid. Roentgenograms were made in a КРОС-1 (KROS-1) inverse camera, in copper radiation, with 30-kv voltage on the tube and 10-ma current. Two 0.8 mm diameter diaphragms spaced 40 mm were used to reduce the line width, and a nickel specimen annealed at 700°C was employed for reference; the roentgenograms were photometered with a МФ-4 (MF-4) photometer. The mean mosaic block size was determined by harmonic analysis of the shape of the

Card 1/3

Changes of Mosaic Block Dimensions in Cold-Rolled Nickel in Annealing

curve (Ref. 8). The results of the harmonic analysis of one measurement series is shown (in Fig. 2) in the form of decomposition coefficients A_n from the harmonic order n. The mean block size at different temperatures of annealing was found by the tangent of the incline angle of the tangents at n=0, and (as seen from the figure) was 0.23; 0.15; 0.22 and 0.09 in the state after rolling, and after annealing at 300, 400, and 600°C. A dependence with three periods was found: a considerable growth of blocks up to 300°C; a decrease at 400 and 500°C; a rapid growth from 500°C up. The recrystallization point of the studied nickel is 505°C. The peculiar decrease is most probably caused by the polygonization phenomenon (Ref. 7). There are 3 figures and 9 references: 3 Soviet, 4 English, 1 German, 1 French.

ASSOCIATION: Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Institute of Nonferrous Metals)

SUBMITTED: April 16, 1959

S/148/60/000/003/009/018
A161/A029

Changes of Mosaic Block Dimensions in Cold-Rolled Nickel in Annealing

Figure 2:

Dependence of the decomposition coefficients on the harmonic order for (331) lines

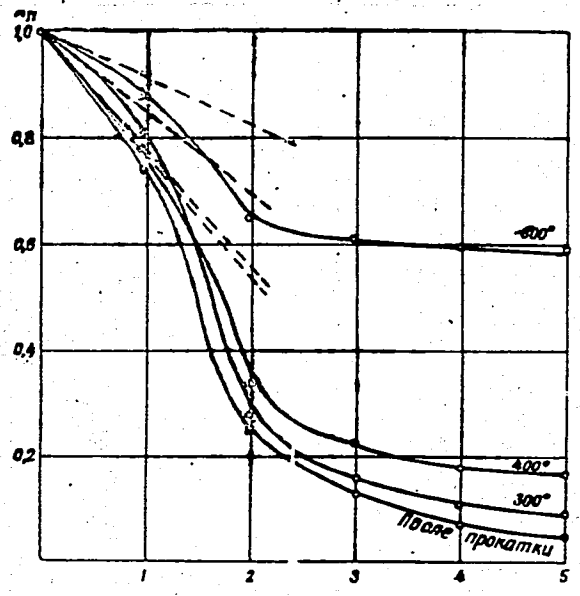

Рис. 2. Зависимости коэффициентов разложения от порядка гармоники для линии (331)

Card 3/3

PUCHKOV, B.I.; RAKHSHTADT, A.G.; ROGEL'BERG, I.L.

Studying stress relaxation in copper alloy springs. Izv. vys. ucheb. zav.; tsvet. met. 3 no.4:145-152 '60. (MIRA 13:9)

1. Vsesoyuznyy zaochnyy politekhnicheskiy institut. Kafedra metallovedeniya i termicheskoy obrabotki metallov.
(Springs (Mechanism)--Testing)
(Copper alloys--Testing)

AGAFONOV, A.G.(Moskva); GOLOMOLZINA, Yu.A.(Moskva); ROGEL'BERG, I.L.(Moskva); SHPICHINETSKIY, Ye.S. (Moskva).

Crystallization of graphite on the surface of commercially pure nickel. Izv. AN SSSR. Otd. tekh. nauk. Met.i topl. no.5:223-224 S-O '60. (MIRA 13:11)

(Nickel--Metallography)

28563 S/137/61/000/009/059/087
A060/A101

18.1220
9.4130 also 1160

AUTHORS: Rogel'berg, I. L., Shpichinetskiy, Ye. S.

TITLE: On the problem of the optimal composition of alloying elements in alloys for the emitters of secondary electrons

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 9, 1961, 24, abstract 9I158 ("Tr. Gos. n.-i. i proyektn. in-ta po obrabotke tsvetn. met.", 1960, no. 18, 215-220)

TEXT: An analysis is carried out of the literature data on the dependence of the coefficient of secondary electron emission δ of metallic alloys upon the concentration of the alloying elements. To establish the optimal compositions of the materials used as emitters of secondary electrons, the binary alloys of Cu, Ag, and Ni with admixtures of Mg, Be, Al, and Ti up to 1 - 9% by weight were investigated. The δ was measured at an acceleration potential of the primary electrons - 300 volts (δ_{300}) at the maximum δ (σ_{max}). Before testing the alloys were activated at temperatures equal to 0.52 - 0.89 of their melting temperature (reckoned in the absolute scale). It was established that the nature of the dependence of δ_{300} and δ_{max} upon the concentration of the alloying elements is

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28563 S/137/61/000/009/059/087
A060/A101

On the problem of the optimal composition ...

the same for all the alloys studied: with low concentrations of the alloying metals the δ does not depend upon the concentration and only exceeds the δ of the base metal slightly, taking the values 1.5 - 2.8; an increase in the concentration of the alloying metal causes a stepwise increase of δ_{300} and δ_{max} up to the values 4.6 - 6.5 and 5.7 - 8.5 respectively, which then do not change at a further addition of alloying metal. The width of the step-wise variation region for δ does not exceed 0.1% by weight. The concentration values are found at which the δ undergo the jump. They are (in % of the second element): Al - Mg (0.3), Cu - Mg (0.6), Ni - Mg (0.8), Cu - Be (0.35), Al - Mg (0.2), Ni - Be (0.6), Cu - Al (0.8), Cu - Ti (1.1), Ag - Be (0.2). The results obtained make it possible to conclude that the optimal compositions of alloys for secondary-electron emitters are determined by two factors: From below, the range of the possible compositions is restricted by the specific requirement, - to obtain the greatest possible δ (as compared with unalloyed metal), and its upper limit depends only upon the mechanical properties of the alloy (flowability, deformability, etc). There are 16 references.

A. Danilin

[Abstracter's note: Complete translation]

Card 2/2

S/137/61/000/010/039/056
A006/A101

AUTHORS: Krapivina, T.G., Novikov, I.I., Rogel'berg, I.L.

TITLE: Grain growth and softening of nickel of different purity during annealing

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 22-23, abstract 10I165 ("Tr. Gos. n.-i. i proyektn. in-ta po obrabotke tsvetn. met", 1960, no. 18, 118 - 123)

TEXT: The authors studied the effect of the chemical composition on the grain size of the following grades of commercially pure Ni and high-purity Ni: 1) Ni of 99.99% purity in the form of cathodes which were not remelted; 2) the same Ni subjected to degassing in a 10^{-5} mm Hg vacuum at 1,200°C for 40 minutes; 3) remelted cathode Ni containing 0.18% O; 4) the same deoxidized with 0.2% Mg; 5) the same deoxidized with 0.1% C; 6) the same deoxidized with 0.1% C, 0.08% Si and 0.08% Mg (a complex deoxidizer). The specimens were first hot rolled and then subjected to cold rolling with 50% reduction. Microstructure and hardness were studied on specimens, annealed at 500-900°C during 10, 20, 40, 80, 160, 320 and 640 minutes. All Ni grades, excepted that deoxidized with the complex de-

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Grain growth and softening of nickel ...

oxidizer, were fully softened after annealing at 500°C. For the softening of the latter, annealing during many hours at 600°C is required. The hardness of fully annealed specimens varies within 20 - 40 units on the R_{30-T} scale. Cathode Ni, annealed under any conditions, is always much harder than the same Ni which was preliminarily degassed in a vacuum. The grain size of all Ni grades, except the one deoxidized with the complex deoxidizer, varies within 20 - 40 μ after 1 hour annealing at 700 - 900°C. The grain size of Ni deoxidized with 0.1% C varies unusually during annealing: an increase of the annealing temperature from 600 to 700°C entails a reduced grain size (from 60 - 70 to about 20 μ). Ni deoxidized with the complex deoxidizer, showed the greatest proneness to grain growth. This is probably explained by the specific effect of Si. This viewpoint is confirmed by the intensity of the grain growth in the binary Ni alloy with 0.21% Si. The strong coarsening of the grains can be explained by the fact that Ni, deoxidized with the complex deoxidizer, was well desulfurized with Mg.

N. Sladkova

[Abstracter's note: Complete translation]

Card 2/2

GEVELING, N.N.; PUCHKOV, B.I.; RAKHSHTADT, A.G.; ROGEL'BERG, I.L.

Device for measuring the stress relaxation of thin spring belts during bending. Zav.lab. 27 no.1:89-91 '61. (MIRA 14:3)

1. Moskovskoye Vyssheye tekhnicheskoy uchilishche imeni Baumana i Giprotsvetmetobrabotka.
(Springs(Mechanism)--Testing)

28562 S/137/61/000/009/058/087
A060/A101

18.1220
9,4130 also 1160

AUTHORS: Rogel'berg, I. L., Shpichinetskiy, Ye. S.

TITLE: Aluminum-magnesium-bronze, an alloy for secondary-electron emitters

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 9, 1961, 23, abstract 9I153 ("Tr. Gos. n.-i. i proyektn. in-ta po obrabotke tsvetn. met.", 1960, no. 18, 221-232)

TEXT: Copper based alloys with admixtures of Mg for the manufacture of emitters of secondary electrons are discussed. Their important drawbacks are poor technological characteristics: large interval of crystallization, low flowability, considerable evaporation and oxidation of Mg in the process of smelting and casting. An additional alloying of the indicated Al alloys is proposed for eliminating these drawbacks. Ternary compositions were investigated with Al content up to 10% by weight and Mg content up to 4% by weight. Their coefficient of secondary electron emission was measured in a range of primary electron energies 100 - 700 volts, and their mechanical properties in the temperature range 650 - 850°C were determined. On the basis of the experiments carried out, a concentration region of alloys which possess the required

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28562 S/137/61/000/009/058/087
A060/A101

Aluminum-magnesium-bronze, an alloy ...

operational and technological characteristics was outlined in the phase diagram of Cu-Al-Mg. As the optimal alloy, a bronze with 5 - 6% Al by weight and 1% Mg by weight [Sp. AMr6-1 (Br. Amg 6-1)] is proposed, the production of which in the form of strips has been mastered on an industrial scale.

A. Danilin

[Abstracter's note: Complete translation]

Card 2/2

PUCHKOV, B.I.; ROGEL'BERG, I.L.

Causes of aluminum bronze hardening under the effect of relaxation. Fiz. met. i metalloved. 10 no.2:302-305 Ag '60. (MIRA 13:9)

1. Giprotsvetmetobrabotka.
(Aluminum bronze--Heat treatment)

SIROTA, A.M.; MAL'TSEV, B.K.; NUZHNOV, A.G.; POKROVSKAYA, G.N.; ROGEL'BERG, I.L.; GORDOV, A.N.; ERGARDT, N.N.

Methods of testing thermoelectrodes and thermocouples. Zav.lab. 26 no.1:120-122 '60. (MIRA 13:5)

1. Vsesoyuznyy teplotekhnicheskiy institut (for Sirota and Mal'tsev). 2. Kamensk-Ural'skiy zavod po obrabotke tsvetnykh metallov i Gosudarstvennyy nauchno-issledovatel'skiy institut po obrabotke tsvetnykh metallov (for Nuzhnov, Pokrovskaya and Rogel'berg).
(Thermocouples) (Electrodes)

ROGEL'BERG, I. L.

23005 O tochnosti postroeniya granits rastvorimosti v binarnykh metallicheskikh sistemakh. Zavodskaya laboratoriya, 1949, No. 7, C. 814-17. - Bibliogr: 12 nazv.

SO: LETOPIS' NO. 31, 1949

ZAKHAROV, V.Z.; NOVIKOV, I.I.; ROGEL'BERG, I.L.; YAO MIN'-CHZHI [Yao Ming-chih]

Investigating the influence of certain factors on the critical stage of aluminum deformation. Izv.vys.ucheb.zav.; tsvet.met. no.6:126-129 '58. (MIRA 12:2)

1. Moskovskiy institut tsvetnykh metallov i zolota, kafedra metallovedeniya.
(Aluminum--Metallurgy) (Deformations (Mechanics))

NOVIKOV, I.I.; ROGEL'BERG, I.L.

Activation energy of grain growth during collective recrystallization of various purity nickel. Fiz. met. i metalloved. 6 no.6:1132-1133 '58. (MIRA 12:1)

1. Moskovskiy institut tsvetnykh metallov i zolota imeni M.I. Kalinina Guprotsvetmetobrabotka.
(Activity coefficients) (Crystallization)

RAKHSHTADT, A.G., kand.tekhn.nauk; ROGEL'BERG, I.L., kand.tekhn.nauk;
VOROB'YEVA, L.P., inzh.; PUCHKOV, B.I., inzh.

Effect of heat treatment on the properties and structure of beryllium bronze. Metalloved.i term.obr.met. no.2:20-31 F '60.

1. Moskovskoye vysshaye tekhnicheskoye uchilishche imeni Baumana i Giprotsvetmetobrabotka.
(Bronze--Heat treatment)
(Copper-Beryllium alloys--Metallography)

ROGEL'BERG, I.L., kand.tekhn.nauk

"Handbook on machine manufacturing materials; vol. 2: Nonferrous metals and their alloys." Metalloved. i term. obr. met. no.5: 58-59 My '61. (MIRA 14:5)

(Nonferrous metals)

ROGEL'BERG, I.L.

82444

S/149/60/000/004/008/009

18.1220

AUTHORS: Puchkov, B.I., Rakhshtadt, A.G., Rogel'berg, I.L.

TITLE: Investigation Into Relaxation of Copper Alloys for Springs

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, 1960, No. 4, pp. 145-152

TEXT: Information is given on results of investigations into the relaxation of stress of basic copper alloy grades, used for the manufacture of springs. The authors tested 0.3-mm thick strips of the following materials: aluminum bronze БрА7 and БрАМц9-2 (BrA7 and BrAMts 9-2); tin bronze БрОФ6.5-0.15 (BrOF 6.5-0.15), БрОФ4-0.25 (BrOF 4-0.25), БрОЦ4-3 (BrOTs 4-3); brass Л85, Л68, Л62 (L85, L68, L62); German silver МНЦ15-20 (MNTs 15-20); manganese silicide bronze БрКМц3-1 (BrKMts 3-1); berryllium bronze Бр62 (BrB2) and copper-nickel-manganese alloy МНМц20-20 (MNMts 20-20). The method of bending thin flat specimens was used for the relaxation tests. The method of mechanical tensometry was employed to determine the decrease in stress, caused by relaxation, from changes in the radius of curvature of the specimens after holding them at a given temperature for a given time. The relaxable stress was calculated by the following formula:

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82444

S/149/60/000/004/008/009

Investigation Into Relaxation of Copper Alloys for Springs

$$\sigma_\tau = \frac{Eh}{2}\left(\frac{1}{R} - \frac{1}{r}\right)$$

where E is the modulus of normal elasticity, kg/mm^2; h is the thickness of the strip, mm; R is the initial radius of curvature, mm; r is the radius of curvature of the strip after relaxation. The relaxation of stress was studied depending on the temperature (200-350°C); the degree of preliminary cold deformation; the magnitude of initial stress and the sense of the specimen cut-out in respect to the sense of rolling. The magnitude of initial stress, approaching the elastic limit, was calculated by the extrapolation method. The following results were obtained: In alloys strengthened by deformation the highest relaxation stability was observed at 200-350°C in MNTs 15-20, BrAMts 9-2, BrKMts 3-1 and BrOTs 4-3; in the group of alloys strengthened by heat treatment highest relaxation stability at 250°C was revealed in the MnMts 20-20 alloy, exceeding that of beryllium bronze, which showed high relaxation stability up to 200°C. For alloys strengthened by hard facing, the relaxation process, occurring at temperatures below the beginning of recrystallization, may be described by the relation $\sigma_\tau = \sigma_0 - K \lg \tau$; The relaxation rate increases noticeably after the temperature of recrystallization has been attained. The magnitude of the relaxation stress decreases and the relaxation rate increase with a higher degree of preliminary cold deformation. For alloys

Card 2/3

Ca

L 20102-65 EPA(s)-2/EWT(m)/EWA(d)/EWP(t)/EPA(bb)-2/EWP(b) Pt-10/Pad IJP(c)
ACCESSION NR: AT4045677 JD/HW/WB S/2680/64/000/022/0171/0179

AUTHOR: Gil'dengorn, I. S.; Rogel'berg, I. L.

TITLE: Comments on the question of the oxidation of nickel-aluminum alloys

SOURCE: Moscow. Gosudarstvenny*y nauchno-issledovatel'skiy i proyektny*y institut splavov i obrabotki tsvetny*kh metallov. Trudy*, no. 22, 1964. Issledovaniye splavov dlya termopar (Studying alloys for thermocouples), 171-179

TOPIC TAGS: nickel aluminum alloy, oxidation, scale formation

ABSTRACT: The effect of Al additions on high-temperature oxidation of Ni and the kinetics and structure of the scale in Ni specimens and Ni alloys with 1, 2, 3, 4, 5 and 6% by weight of Al were studied. Up to 4% Al in Ni enhanced the oxidation rate but further additions up to 6% lowered this rate without making the alloy more oxidation-resistant than Ni. The only exception was an alloy with 6% Al whose rate of oxidation was lower at 1200C than that of Ni. After a 44-48 hour holding period some specimens turned entirely into scale. The kinetics of oxidation of

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L 20102-65
ACCESSION NR: AT4045677

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...st investigated alloys are adequately described by the parabolic law with deviations from it observed in the oxidation of an alloy with 5% Al at 1200C and an alloy with 6% Al at 1000, 1100 and 1200C. The increase in the rate of oxidation is explained by Wagner's theory of oxidation. (Abstractor's Note: the theory was not stated). Insofar as the surface formation of NiO accompanies oxidation, the penetration of Al^3 ions into the NiO lattices increases the concentration of cation vacancies and, consequently, enhances the rate of diffusion and oxidation. Apparently, Al additions in quantities over 4% lower the oxidation rate as a result of the formation of NiO. Al_2O_3 and Al_2O_3 scale in the inner layer which inhibits diffusion. Orig. art. has: 7 figures and 2 tables.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov, Moscow (State Scientific Research and Planning Institute for the Processing of Nonferrous Metals)

SOV/137-58-10-20788

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 63 (USSR)

AUTHORS: Luzenberg, A.A., Rogel'berg, I.L., Shpichinetskiy, Ye.S.

TITLE: Production of LNO-grade Plastic Nickel with Minimal Non-metallic Inclusions (Polucheniye plastichnogo nikelya marki LNO s minimal'nym kolichestvom nemetallicheskikh vklyucheniy)

PERIODICAL: Byul. tsvetn. metallurgii, 1957, Nr 22, pp 28-31

ABSTRACT: In the production of LNO-grade Ni strip at the Kol'chugino Plant im. S. Ordzhonikidze, rejects due to cold brittleness came to as much as 15% of the weight of the finished product. It is found that the brittleness of Ni strip is related not to an increase in the free C contents, but to inadequate deoxidation in the desulfurization of Ni. A new process of treatment of Ni melt and of introduction of Mg therein for degasification and desulfurization is suggested. The method of deoxidation suggested was tested with various types of mix and made it possible completely to eliminate rejects due to brittleness and oxide film. 1. Nickel--Production 2. Nickel--Impurities 3. Nickel --Mechanical properties 4. Oxide films--Metallurgical effects. G.E.

Card 1/1

SLAVINSKIY, M.P., professor, doktor [deceased]; FILIN, N.A., professor, doktor, retsenzent; SHPICHINETSKIY, kandidat tekhnicheskikh nauk, retsenzent; ROGEL'BERG, I.L., inzhener, retsenzent; SAMSONOV, G.V., redaktor; KAMAYEVA, O.M., redaktor; MIKHAYLOVA, V.V., tekhnicheskiy redaktor

[Physical and chemical properties of elements] Fiziko-khimicheskie svoistva elementov. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1952. 763 p. (MLRA 9:12)
(Chemistry, Metallurgic) (Chemical elements)

Rogel'berg, I. L.

Nonpassivating nickel anode for nickel plating. I. L. Rogel'berg and E. S. Shpichinetskiĭ. U.S.S.R. 103,542, Aug. 25, 1956. To prevent passivation and reduce the amt. of formed slime, the Ni contains admixts. of sulfides having a higher soln. potential than Ni, e.g., NiS or MnS, in the amt. of 0–0.3% Si, Al, Ti, or Mn is used as a deoxidizer in the anode. M. Hoch

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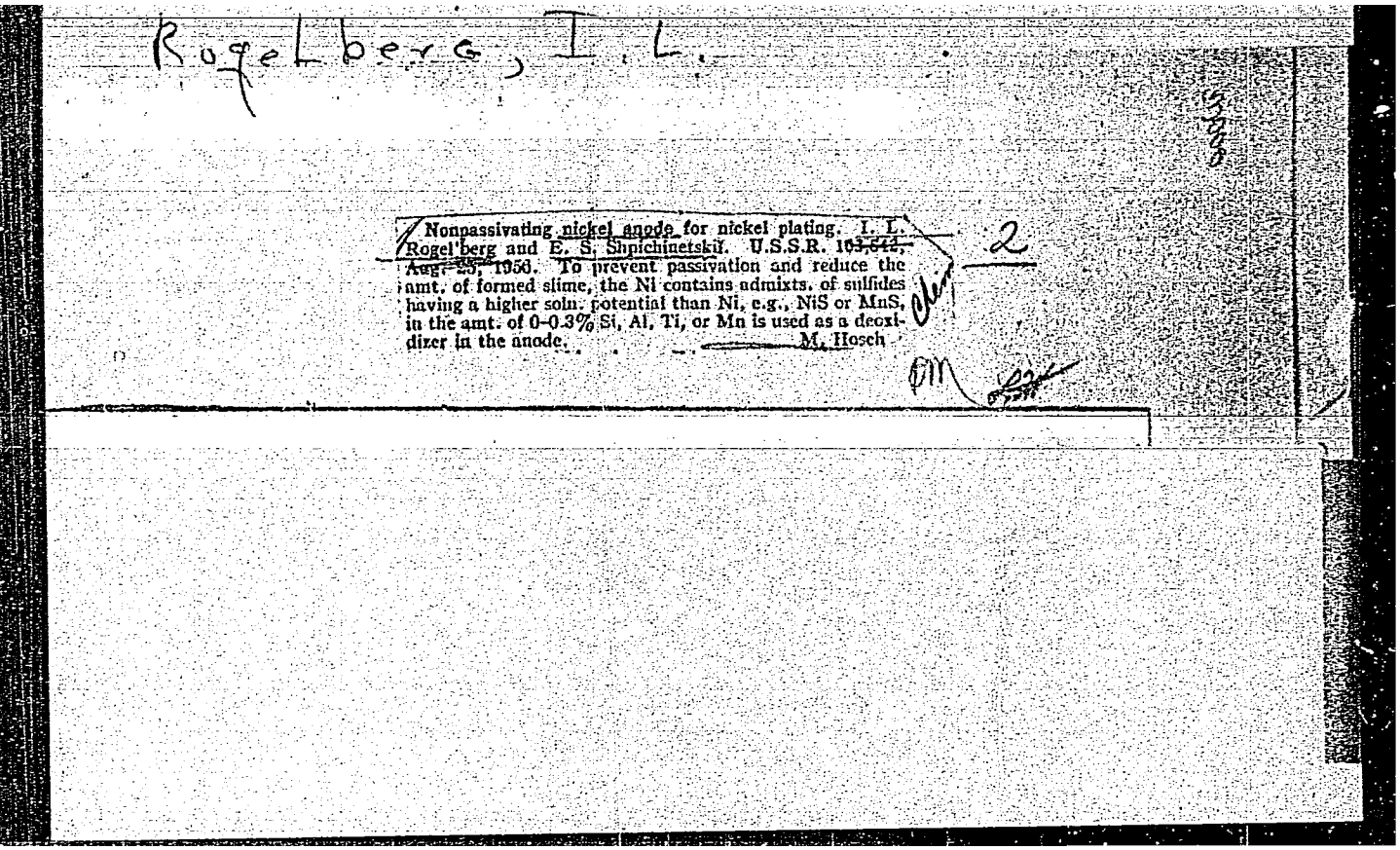
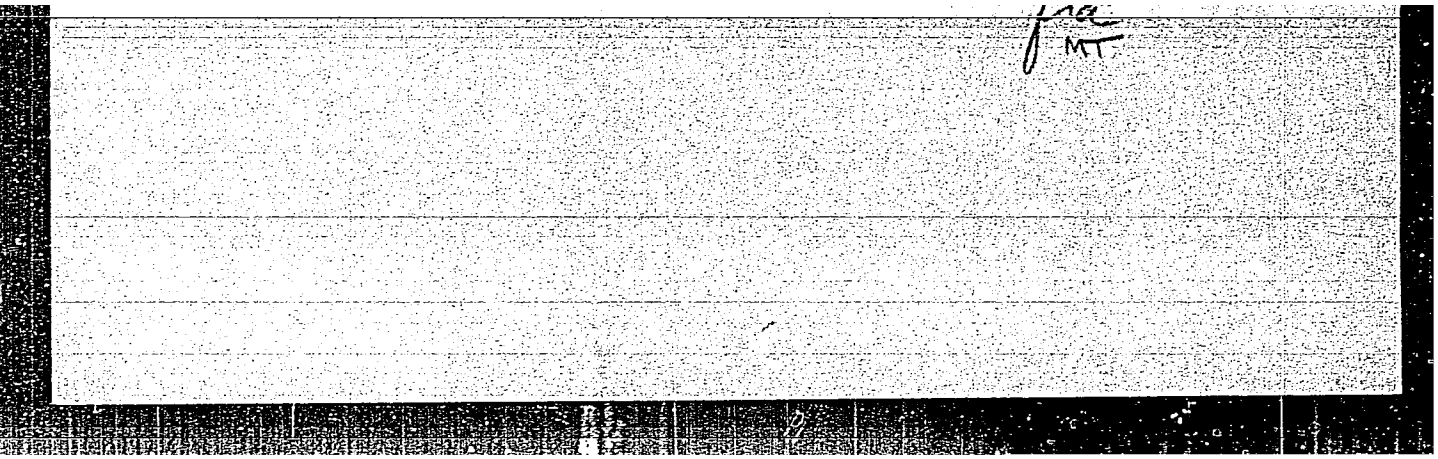


Rogelberg, I. L.

Nonpassivating nickel anode for nickel plating. I. L. Rogel'berg and E. S. Shpichinetskiĭ. U.S.S.R. 103,642, Aug. 25, 1956. To prevent passivation and reduce the amt. of formed slime, the Ni contains admixts. of sulfides having a higher soln. potential than Ni, e.g., NiS or MnS, in the amt. of 0–0.3% Si, Al, Ti, or Mn is used as a deoxidizer in the anode. M. Hosch



ROGEL'BERG, I.L.

ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.

Ni-W, Ni-Ca, and Ni-Sr alloys for oxide cathodes of radio tubes.
TSvet. met. 30 no.11:67-74 N '57. (MLRA 10:11)

1. Giprotsvetmetobrabotka.
(Electron tubes) (Nickel alloys) (Cathodes)

GERMAN, A.Yu.; ZAKHAROV, V.Z.; NOVIKOV, I.I.; ROGEL'BERG, I.L.

Reduction of the plasticity of metals annealed following small plastic deformations. Izv.vys.ucheb.zav.; tsvet.met. 3 no.2: 156-160 '60. (MIRA 15:4)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra metallovedeniya.
(Annealing of metals) (Plasticity)

PUCHKOV, B.I.; RAKHSHTADT, A.G.; ROGEL'BERG, I.L.; prinimali uchastiye: ALIMARINA, G.A.; SOKOLOVA, I.M.

Anisotropy of the elasticity limit of industrial copper spring alloys. TSvet. met. 35 no.6:67-70 Je '62. (MIRA 15:6)
(Copper alloys--Testing) (Elasticity)

KRAPIVINA, T.G.; NOVIKOV, I.I.; ROGEL'BERG, I.L.

Grain growth and the softening of various purity nickel during the annealing process. Trudy Giprotsvetmetobrabotka no.18:118-123 '60. (MIRA 13:10)

(Nickel--Metallography) (Annealing of metals)

ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.

Optimum content of addition elements in alloys for secondary electron emitters. Trudy Giprotsvetmetobrabotka no.18:215-220 '60.
(MIRA 13:10)

(Secondary electron emission) (Alloys)

RAKHSHTADT, A.G., kand.tekhn.nauk; ROGEL'BERG, I.L., kand.tekhn.nauk;
PUCHKOV, B.I., inzh.; SVESHNIKOVA, G.A., inzh.

Investigating methods of strengthening copper-base spring alloys.
Metalloved. i term. obr. met. no.1:45-56 Ja '62. (MIRA 15:1)

1. Moskovskoye vyssheye tekhnicheskoye uchilishche imeni Baumana
i Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut
obrabotki tsvetnykh metallov.
(Copper alloys--Heat treatment) (Deformations (Mechanics))

ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.

Aluminum-magnesium bronze is an alloy for secondary electron emitters.
Trudy Giprotsvetmetobrabotka no.18:221-232 '60. (MIRA 13:10)
(Copper-aluminum-magnesium alloys)
(Secondary electron emission)

88287
S/032/61/027/001/025/037
B017/B054

1.9600

AUTHORS: Geveling, N. N., Puchkov, B. I., Rakhshtadt, A. G., and Rogel'berg, I. L.

TITLE: Device for Measuring the Relaxation of Stress in Thin Metal Tapes on Bending

PERIODICAL: Zavodskaya laboratoriya, 1961, Vol. 27, No. 1, pp. 89-91

TEXT: To study the relaxation of stress in thin metal tapes made of spring alloys, the tapes were attached to cylindrical frame by means of two ledges. The magnitude of initial stress depends on the frame diameter and thickness of the metal tape. The relaxation stress is calculated from the equation $\sigma_r = 0.5\ E\ h\ (\frac{1}{R} - \frac{1}{r})$, where E = modulus of elasticity, h = thickness of the metal tape, R = initial radius of the arc, and r = arc radius after relaxation. The kinetics of the relaxation stress was studied with beryllium bronze. There are 3 figures and 5 Soviet references.

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88287

Devices for Measuring the Relaxation of Stress in Thin Metal Tapes on Bending

S/032/61/027/001/025/037
B017/B054

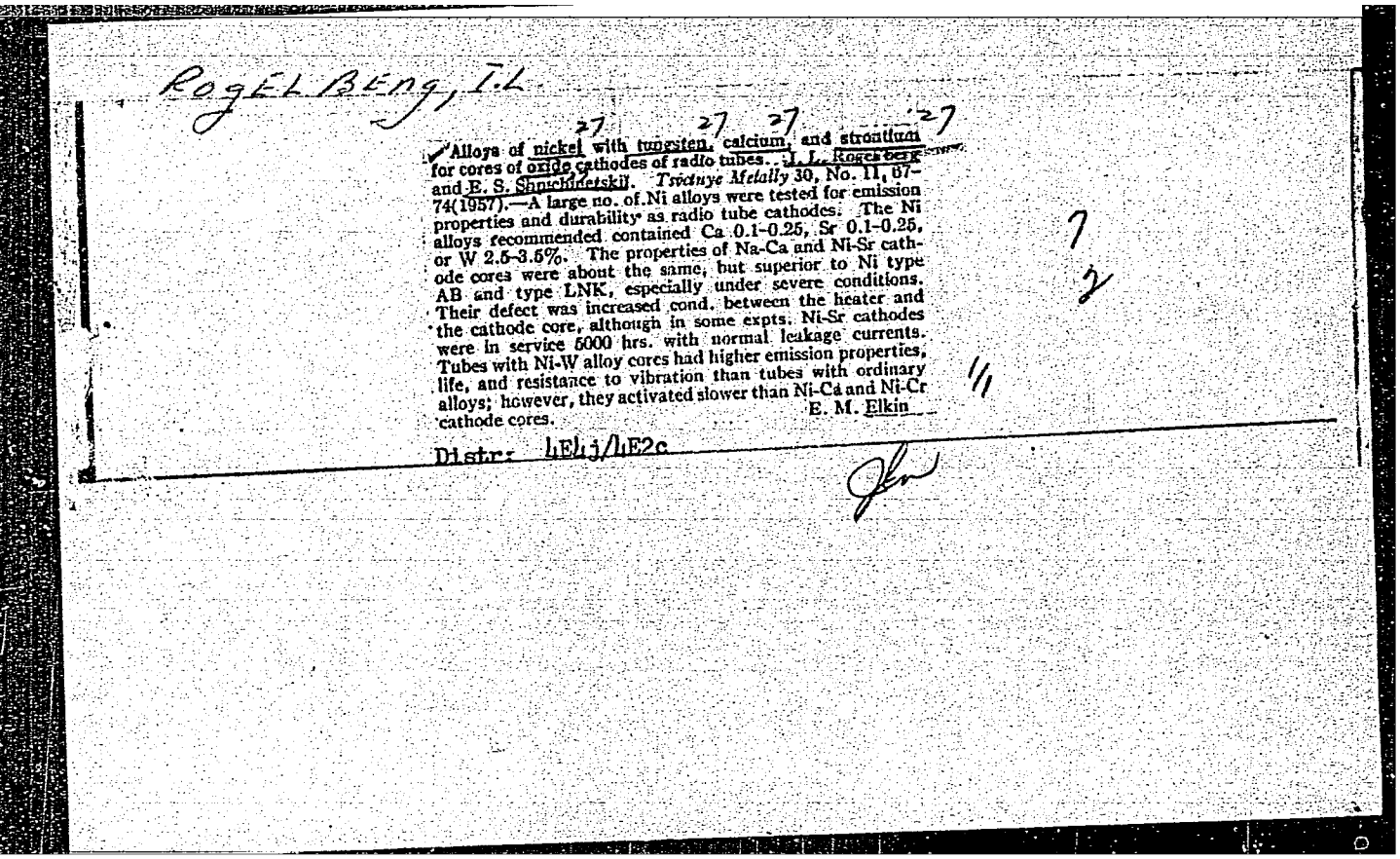
ASSOCIATION: Moskovskoye vyssheye tekhnicheskoye uchilishche im. Baumana (Moscow Higher Technical School imeni Bauman).
Giprotsvetmetobrabotka (State Design and Planning Scientific Research Institute for the Processing of Nonferrous Metals)

Card 2/2

ROGEL'BERG, I.L.

Investigating the solubility of magnesium in copper and the combined solubility of magnesium and aluminum in copper. Trudy GIPROTSVETMET-OBRABOTKA no.16:82-89 '57. (MIRA 11:3)

(Solutions, Solid)



ROGELBERG, I.L.

27 27 27 27

Alloys of nickel with tungsten, calcium, and strontium for cores of oxide cathodes of radio tubes. I. L. Rogelberg and E. S. Shpichinetskii. *Tsvetnye Metally* 30, No. 11, 67–74(1957).—A large no. of Ni alloys were tested for emission properties and durability as radio tube cathodes. The Ni alloys recommended contained Ca 0.1–0.25, Sr 0.1–0.25, or W 2.5–3.5%. The properties of Na-Ca and Ni-Sr cathode cores were about the same, but superior to Ni type AB and type LNK, especially under severe conditions. Their defect was increased cond. between the heater and the cathode core, although in some expts. Ni-Sr cathodes were in service 5000 hrs. with normal leakage currents. Tubes with Ni-W alloy cores had higher emission properties, life, and resistance to vibration than tubes with ordinary alloys; however, they activated slower than Ni-Ca and Ni-Cr cathode cores. E. M. Elkin

7
2
1/1

Distr: 4Elj/4E2c

ROGEL'BERG, I. I.

62/49T80

USSR/Metals Jul 49
Alloys
Solubility

"Accuracy in Determining the Limits of Solubility in Binary Metallic Systems," I. L. Rogel'berg, S. Kh. Kirnis, 4 pp

"Zavod Lab" No 7

Attempts to throw light on the problem of average possible and maximum accuracy in determining limits of solubility under given conditions. Analyzes accuracy possible in measuring properties and structure, temperature (and its regulation), chemical analysis, and the relationship

FDD 62/49T80

USSR/Metals (Contd) Jul 49

between the relative errors of these measurements, with practical example. Concludes that accuracy in measuring temperature will usually determine maximum accuracy in constructing the limits of solubility since other relative errors are several times larger than temperature error.

FDD 62/49T80

ROGEL'BERG, I. L.

Low-Tin and Tin-Free Solders and Tinning Materials. E. S. Shpichinetsky and I. L. Rogel'berg (Tsvet, Metally, 1945, (2), 27-32). - (In Russian). A review of the literature.- N. A.

ROGEL'BERG, I. L.

11-9. Thermoelectric Method of Determining the Limit of Solubility of Manganese in Aluminum. (In Russian.) I.L. Rogel'berg and E.S. Shvichinetskii. Zavodskaya Laboratoriya (Factory Laboratory), v. 14, Oct. 1948, p. 1216-1218.

The method, the apparatus used and results obtained.

immediate source clipping

ROGELLBERG, I. L.

USSR/Chemistry - Solutions, Solid of Oct 48
Magnesium in Aluminum
Chemistry - Solubility

"Thermoelectric Method for Determining the Solubility Limits of Manganese in Aluminum," I. L. Rogellberg, Ye. S. Shpichinetskiy, Giprotsvetmetobrabotka, 2 pp

"Zavod Lab" Vol XIV, No 10

Demonstrates subject method and shows that results achieved by its use compare favorably with those arrived at by metallographic means and the measurement of electrical resistance.

FDB 28/49T11

ROGEL'BERG, I.L.

AL'TGAUZEN, O.N., kandidat fiziko-matematicheskikh nauk; BERNSHTEYN, M.L., kandidat tekhnicheskikh nauk; BLANTER, M.Ye., doktor tekhnicheskikh nauk; BOKSHTEYN, S.Z., doktor tekhnicheskikh nauk; BOLKHOVITINOVA, Ye.N., kandidat tekhnicheskikh nauk; BORZDYKA, A.M., doktor tekhnicheskikh nauk; BUNIN, K.P., doktor tekhnicheskikh nauk; VINOGRAD, M.I., kandidat tekhnicheskikh nauk; VOLOVIK, B.Ye., doktor tekhnicheskikh nauk [deceased]; GAMOV, M.I., inzhener; GELLER, Yu.A., doktor tekhnicheskikh nauk; GORELIK, S.S., kandidat tekhnicheskikh nauk; GOL'DENBERG, A.A., kandidat tekhnicheskikh nauk; GOTLIB, L.I., kandidat tekhnicheskikh nauk; GRIGOROVICH, V.K., kandidat tekhnicheskikh nauk; GULYAYEV, B.B., doktor tekhnicheskikh nauk; DOVGALEVSKIY, Ya.M, kandidat tekhnicheskikh nauk; DUDOVTSEV, P.A., kandidat tekhnicheskikh nauk; KIDIN, I.N., doktor tekhnicheskikh nauk; KIPNIS, S.Kh., inzhener; KORITSKIY, V.G., kandidat tekhnicheskikh nauk; LANDA, A.F., doktor tekhnicheskikh nauk; LEYKIN, I.M., kandidat tekhnicheskikh nauk; LIVSHITS, L.S., kandidat tekhnicheskikh nauk; L'VOV, M.A., kandidat tekhnicheskikh nauk; MALYSHEV, K.A., kandidat tekhnicheskikh nauk; MEYERSON, G.A., doktor tekhnicheskikh nauk; MINKEVICH, A.N., kandidat tekhnicheskikh nauk; MOROZ, L.S., doktor tekhnicheskikh nauk; NATANSON, A.K., kandidat tekhnicheskikh nauk; NAKHIMOV, A.M., inzhener; NAKHIMOV, D.M., kandidat tekhnicheskikh nauk; POGODIN-ALEKSEYEV, G.I., doktor tekhnicheskikh nauk; POPOVA, N.M., kandidat tekhnicheskikh nauk; POPOV, A.A., kandidat tekhnicheskikh nauk; RAKHSHTADT, A.G., kandidat tekhnicheskikh nauk; ROGEL'BERG, I.L., kandidat tekhnicheskikh nauk;

(Continued on next card)

AL'TGAUZEN, O.N.---- (continued) Card 2.

SADOVSKIY, V.D., doktor tekhnicheskikh nauk; SALTYKOV, S.A., inzhener; SOBOLEV, N.D., kandidat tekhnicheskikh nauk; SOLODIKHIN, A.G., kandidat tekhnicheskikh nauk; UMANSKIY, Ya.S., kandidat tekhnicheskikh nauk; UTEVSKIY, L.M., kandidat tekhnicheskikh nauk; FRIDMAN, Ya.B., doktor tekhnicheskikh nauk; KHIMYSHIN, F.F., kandidat tekhnicheskikh nauk; KHRUSHCHEV, M.M., doktor tekhnicheskikh nauk; CHERNASHKIN, V.G., kandidat tekhnicheskikh nauk; SHAPIRO, M.M., inzhener; SHKOL'NIK, L.M., kandidat tekhnicheskikh nauk; SHRAYBER, D.S., kandidat tekhnicheskikh nauk; SHCHAPOV, N.P., doktor tekhnicheskikh nauk; GUDTSOV , N.T., akademik, redaktor; GORODIN, A.M. redaktor izdatel'stva; VAYNSHTEYN, Ye.B., tekhnicheskiy redaktor

[Physical metallurgy and the heat treatment of steel and iron; a reference book] Metallovedenie i termicheskaia obrabotka stali i chuguna; spravochnik. Pod red. N.T.Dudtsova, M.L.Bernshteina, A.G. Rakhshtadta. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1956. 1204 p. (MLRA 9:9)

1. Chlen -korrespondent Akademii nauk USSR (for Bunin)
(Steel--Heat treatment) (Iron--Heat treatment)
(Physical metallurgy)

LUZINBERG, A.A.; ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.

Production of the LNO-brand plastic nickel having minimum non-metallic inclusions. Biul. TSIIN tsvet. met. no.22:28-31 '57. (MIRA 11:8)
(Nickel--Metallugy)

S/032/60/026/01/048/052
B010/B001

28 (5)

AUTHORS: Nuzhnov, A. G., Pokrovskaya, G. N., Rogel'berg, I. L.

TITLE: On Testing Methods for Thermoelectrodes and Thermocouples (On the Occasion of the Paper by A. N. Gordov and N. N. Ergardt Published in the Periodical "Zavodskaya laboratoriya", 1958, Vol 24, Nr 12)

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol 26, Nr 1, p 121 (USSR)

ABSTRACT: A number of authors (Ref 1) investigated the stability of thermocouples by means of two methods. One method determines the variation of the thermoelectric force of the thermoelectrodes depending on the temperature and the duration of the stay in the furnace. The second method determines the stability from the variation of the thermoelectric force due to different immersion depths of the thermocouple into the furnace. The authors mentioned in the title consider investigations of the variation of the thermoelectric force of the thermoelectrodes at any working conditions, as examinations "of stability". They consider examinations with unchanged position of the thermocouple as "examinations of the duration of application". Contrary to the authors

Card 1/2

On Testing Methods for Thermoelectrodes and Thermo- S/032/60/026/01/048/052
couples (On the Occasion of the Paper by A.N. Gordov B010/B001
and N. N. Ergardt Published in the Periodical
"Zavodskaya laboratoriya", 1958, Vol 24, Nr 12). II

mentioned in the title, the present authors assume that the latter examinations are to be considered criteria for the stability of the thermocouples since the majority of the thermocouples are used under stationary conditions. For this reason, only a small section of the paper by I. P. Zubov (Ref 1) (which was criticized in the paper mentioned in the title) and of the paper by Dal' (Ref 1) was devoted to the second method mentioned above. For the same reason, the stability of chromel-, alumel-, and kopel wires is tested at strictly fixed position of the thermoelectrodes in the furnace at the present factory. There is 1 Soviet reference.

ASSOCIATION: Kamensk-Ural'skiy zavod po obrabotke tsvetnykh metallov (Kamensk-Ural'skiy Factory for the Working of Nonferrous Metals).
Gosudarstvennyy nauchno-issledovatel'skiy institut po obrabotke tsvetnykh metallov (State Scientific Research Institute for the Working of Nonferrous Metals)

Card 2/2

ROGEL'BERG, I.L.

137-58-4-8123

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 251 (USSR)

AUTHOR: Rogel'berg, I.L.

TITLE: An Investigation of the Solubility of Magnesium in Copper and the Joint Solubility of Magnesium and Aluminum in Copper (Issledovaniye rastvorimosti magniya v medi i sovmestnoy rastvorimosti magniya i alyuminiya v medi)

PERIODICAL: Tr. Gos. n.-i. i proyektn. in-ta po obrabotke tsvetn. met., 1957, Nr 16, pp 82-89

ABSTRACT: Solubility was measured by determing electrical resistivity and the temperature coefficient thereof, also by microstructural study of 15 Cu-Mg alloys having 0.2-4% Mg and 81 alloys having up to 9% Al and 4% Mg. The Cu-Mg alloys were smelted from 99.99% Cu and Mg containing 0.04% Fe, 0.02% Si, and 0.011% Cu. Carbon crucibles were used, and smelting was done under a flux of an equimolecular mixture of Na and K chlorides. The alloys were annealed at 700, 600, 500, 400, and 300°C, followed by quenching in water. Metallographic sections were etched with 2% HNO_3 in butyl alcohol and a 2% $K_2Cr_2O_7$ solution in 10% H_2SO_4, making it possible to separate out the

Card 1/2

An Investigation of the Solubility (cont.)

Cu+ Cu_2Mg eutectic by virtue of the fact that it takes on a bright red color in polarized light. Resistivity was measured with a double Thomson bridge in an oil chamber for maintaining uniform temperature. The maximum solubility of Mg in Cu in the solid state is >3%. Al-Mg-Cu alloys were smelted from AV000 Al and MG-1 Mg. The solubility boundary was determined by microscopic means. The alloys were subjected to the following heat treatment: 1) anneal at 700° for 2 days, water quench; 2) 400° anneal, 10 days, water quench; 3) 700° anneal, 2 days, cooling at 10°/hr. When Al contents were >2%, the solubility boundary revealed little change with reduction in temperature. At 700°, the effect of deformations of the alloys on solubility was quite pronounced.

1. Aluminum-copper-magnesium alloys--Structural analysis 2. Magnesium --Solubility 3. Aluminum--Solubility

A. F.

Card 2/2

ROGOZ, J

POLAND/Morphology of Man and Animals. Blood and Hematopoietic Organs. S-4

Abs Jour: Referat Zh.-Biol., No 1, 10 January 1958, 2899.

Author : Rogoz J.
Inst :
Title : Morphology of Megakaryocytes in a Rabbit Bone Marrow.

Orig Pub: Patol. Polska, 1955, 6, No 2, 119-123.

Abstract: It was found by examining red bone marrow from the upper femoral epiphyses of five healthy rabbits weighing from 1 to 1.2 kg, that megakaryocytes could be subdivided into five classes (in addition to the involutional forms) according to the number of nuclei they contained: those with 2,4,8, 16 or 32 nuclei. The author suggests that megakaryocytes develop by mitotic nuclear division without division of the cytoplasm.

Card : 1/1 -3-

136-11-12/17

AUTHORS: Rogel'berg, I.L. and Shpichinetskiy, Ye.S.

TITLE: Alloys of Nickel with Tungsten, Calcium and Strontium for Cores of Oxide Cathodes of Radio Valves (Splavy nikelya s vol'framom, kal'tsiyem i strontsiyem dlya kernov oksidnykh katodov radiolamp)

PERIODICAL: Tsvetnyye Metally, 1957, No.11, pp. 67 - 74 (USSR).

ABSTRACT: The authors review existing alloys (Soviet and foreign) used for making radio-valve oxide-cathode cores (Tables 1 and 2) and describe work carried out in 1951-1955 on new alloys. The personnel consisted of metallurgists and electric-vacuum technologists including the authors, B.I. Puchkov, L.M. Baranova, B.P. Nikonova, V.S. Parkhomenko, L.N. Manina, A.A. Nekrasov, S.P. Dobrushina, A.N. Makovskaya and others (not named). The selection of alloys for the investigation, the production-technology and the mechanical properties of the products are dealt with. The recommended alloys are Ni-Ca (0.1-0.25%), Ni-Sr (0.1-0.25%) and Ni-W (2.5-3.5%) which contribute good emission properties and long service. The initial characteristics, speed of activation and life of valves with cathodes on Ni-Ca and Ni-Sr cores are practically identical and are considerably better than those of valves with cathodes of types A, B or ЖНК nickel especially under hard conditions. A possible disadvantage,

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136-11-12/17

Alloys of Nickel with Tungsten, Calcium and Strontium for Cores of Oxide Cathodes of Radio Valves

however, is the increased conductivity between heater and core which would appear to limit the applicability of these alloys because of current leakage, but the authors give data to show that this disadvantage is not fully confirmed. Valves with Ni-W alloy cathode cores were found to possess high emission properties, long life and good resistance to vibration and other properties superior to those of valves with standard cores. On the other hand, the activation of the Ni-W core valves is slower than that of Ni-Ca and Ni-Sr core valves. The Ni-W and Ni-Ca alloys are currently being used in various valves; Ni-W alloy tubes are being produced at the Revdinskiy Non-ferrous Metals Treatment Works and strip of all three new alloys is being produced at the experimental plant of the Giprotsvetmetobrobotka organisation.
There are 2 figures, 5 tables and 14 references, 3 of which are Russian, 2 German, 1 French and 8 English.

ASSOCIATION: Giprotsvetmetobrabotka

AVAILABLE: Library of Congress

Card 2/2

1. Cathodes (Electron tubes)-Development 2. Nickel alloys-Applications

ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.; PUCHKOV, B.I.; TITOVA, A.S.

Nickel alloys with high electrical resistance properties for the cathode base of directly heated radio tubes. Trudy Giprotsvetmetobrabotka no.20:117-124 '61. (MIRA 15:2)
(Nickel alloys--Electric properties)

ROGEL'BERG, I.L.

GOLOMOLZINA, Ye.A.; NOVIKOV, I.I.; ROGEL'BERG, I.L.

Delay in recrystallization in a thin aluminium foil following cold working. Dokl. AN SSSR 117 no.2:221-224 N '57. (MIRA 11:3)

1. Moskovskiy institut tsvetnykh metallov i zolota im. M.I. Kalinina. Predstavleno akademikom A.A. Bochvarom.
(Metal foils)

SOV/126-6-6-25/25

AUTHORS: Novikov, I. I. and Rogel'berg, I. L.

TITLE: On the Energy of Activation of Grain Growth in Collective Recrystallisation of Nickel of Various Degrees of Purity (Ob energii aktivatsii rosta zerna pri sobiratel'noy rekristallizatsii nikelya raznoy chistoty)

PERIODICAL: Fizika metallov i metallovedeniye, 1958, Vol 6, Nr 6, pp 1132-1133 (USSR)

ABSTRACT: The authors studied growth of grains in collective recrystallisation in nickel of 99.99% purity. A nickel cathode was degassed in vacuo at 10^{-5} mm Hg at 1200°C. It was then cold-rolled, recrystallised by annealing and cold-rolled again (70% reduction). The cold-rolled samples were then annealed again at 600, 700, 800 and 900°C for different periods of time. In order to compare the results obtained with those of Wensch and Walker (Ref.1), the authors carried out similar experiments on technically pure nickel, which was reduced by means of carbon, silicon and magnesium. The energy of activation of grain growth was found:

$$\mu = A \exp(Qn/RT) \qquad (1)$$

where μ is the mean linear size of grains, A is a constant, Q is the activation energy, R is the gas constant,

On the Energy of Activation of Grain Growth in Collective Recrystallisation of Nickel of Various Degrees of Purity

T is the absolute temperature and n is given by the Beck et al formula (Ref.4):

$$\mu = C\tau^n \qquad (2)$$

where τ is the duration of annealing and C is a constant. It was found that the value of n for the 99% and the technical grades of nickel is practically independent of temperature. The table on p 1133 gives (Col.2) the values of Q in nickel obtained by the authors together with the value of Q reported by Wensch and Walker (Ref.1) and the energies of activation of self-diffusion reported by Hoffman et al (Ref.2) and by Burgess and Smoluchowsky (Ref.3). All the activation energies are given in kcal/g-atom. The values quoted for Q of nickel, range between 71 and 91 kcal/g-atom. The activation energies of self-diffusion in nickel taken from Refs.2 and 3 were 61-67 kcal/g-atom. According to Smoluchowsky (Ref.6), each elementary act of migration of a grain

SOV/126-6-6-25/25

On the Energy of Activation of Grain Growth in Collective Recrystallisation of Nickel of Various Degrees of Purity

boundary involves groups of atoms rather than single atoms. Calculations show that in collective recrystallisation of nickel of high purity about 16 atoms take part in an elementary migration act and about 21 atoms in technically pure nickel. There are 1 table and 6 English references.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota imeni M. I. Kalinina; Giprotsvetmetobrabotka (Moscow Institute of Non-Ferrous Metals and Gold imeni M. I. Kalinin, Giprotsvetmetobrabotka)

SUBMITTED: August 26, 1957.

USCOMM-DC-60,708

Card 3/3

Card 3/3

ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.

Chemical composition of "Depassivated" nickel anodes. TSvet. met. 29 no.8:68-70 Ag '56. (MLRA 9:10)

1. Giprotsvetmetobrabotka.
(Electrolytes--Conductivity)

ROGEL'BERG, I.L.

AID 470

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT

Call No.: TN671.R6

BOOK

Authors: ROGEL'BERG, I. L. and SHPICHINETSKIY, YE. S.

Full Title: DIAGRAMS OF THE RECRYSTALLIZATION OF METALS AND ALLOYS (Manual)

Transliterated Title: Diagrammy rekristallizatsii metallov i splavov (Spravochnik)

PUBLISHING DATA

Originating Agency: None

Publishing House: State Scientific and Technical Publishing House of Literature on Ferrous and Nonferrous Metallurgy

Date: 1950 No. pp.: 280 No. of copies: 3,500

Editorial Staff

Appraiser: Volovik, B. Ye., Prof. Doctor

TEXT DATA

Coverage: This reference book contains 229 diagrams of recrystallization of metals and alloys. The diagrams are three-dimensional and show the relation between the grain size (average surface expressed in micros square), the amount of plastic deformation (expressed in %) and the temperature of annealing (in centigrades). A short outline is presented explaining the present day concept of this kind of recrystallization diagrams and factors which determine them. The values have been taken from experimental results. Each diagram is supple-

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AID 470 - I

Diagrammy rekristallizatsii metallov i splavov
(Spravochnik)

mented with some additional data, such as the exact composition of an alloy, type of sample taken, kind of plastic deformation, time of annealing, and time of cooling. In some cases the original grain size is indicated. The table of contents indicates the metals presented on the diagrams.

In many cases some important data are missing - such as original grain size, temperature of deformation, recovery prior to recrystallization, and the amount of small impurities etc., which limits the value of those diagrams. However, they are based on a very extensive literature (listed at the end of the book) and also on numerous tests made by the authors and by other Soviet metallurgists. Therefore, the book may be of use in determination of grain growths.

Table of Contents

Diagrammy rekristallizatsii metallov i splavov (Spravochnik)

AID 470 - I

Purpose: This reference book is intended for scientific workers of research institutes, technologists and designers of metallurgical and machine-building plants, as well as for students of higher technical institutes.

Facilities: In the preface names of numerous Russian metallurgists are mentioned

No. of Russian and Slavic References: 76 (24 after 1939) out of 126

Available: Library of Congress

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Diagrammy rekristallizatsii metallov i splavov (Spravochnik)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0014451

AID 470 - I

PAGE

Diagrams of recrystallization of copper and its alloys

Diagrams of recrystallization of nickel and its alloys

Diagrams of recrystallization of tin, zinc, lead and of precious metals

Index to diagrams

Literature

Purpose: This reference book is intended for scientific workers of research institutes, technologists and designers of metallurgical and machine-building plants, as well as for students of higher technical institutes.

Facilities: In the preface names of numerous Russian metallurgists are mentioned

No. of Russian and Slavic References: 76 (24 after 1939) out of 126

Available: Library of Congress

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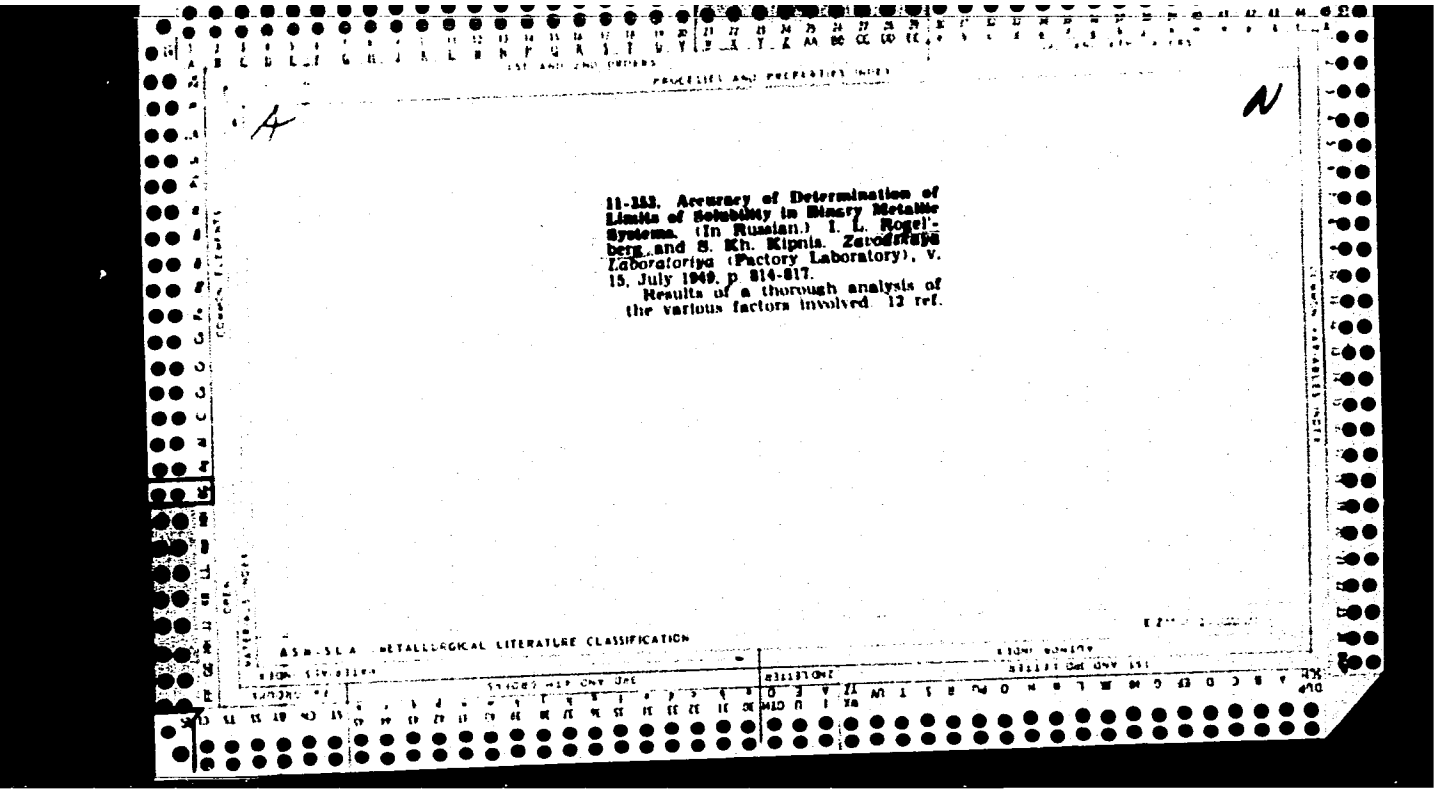
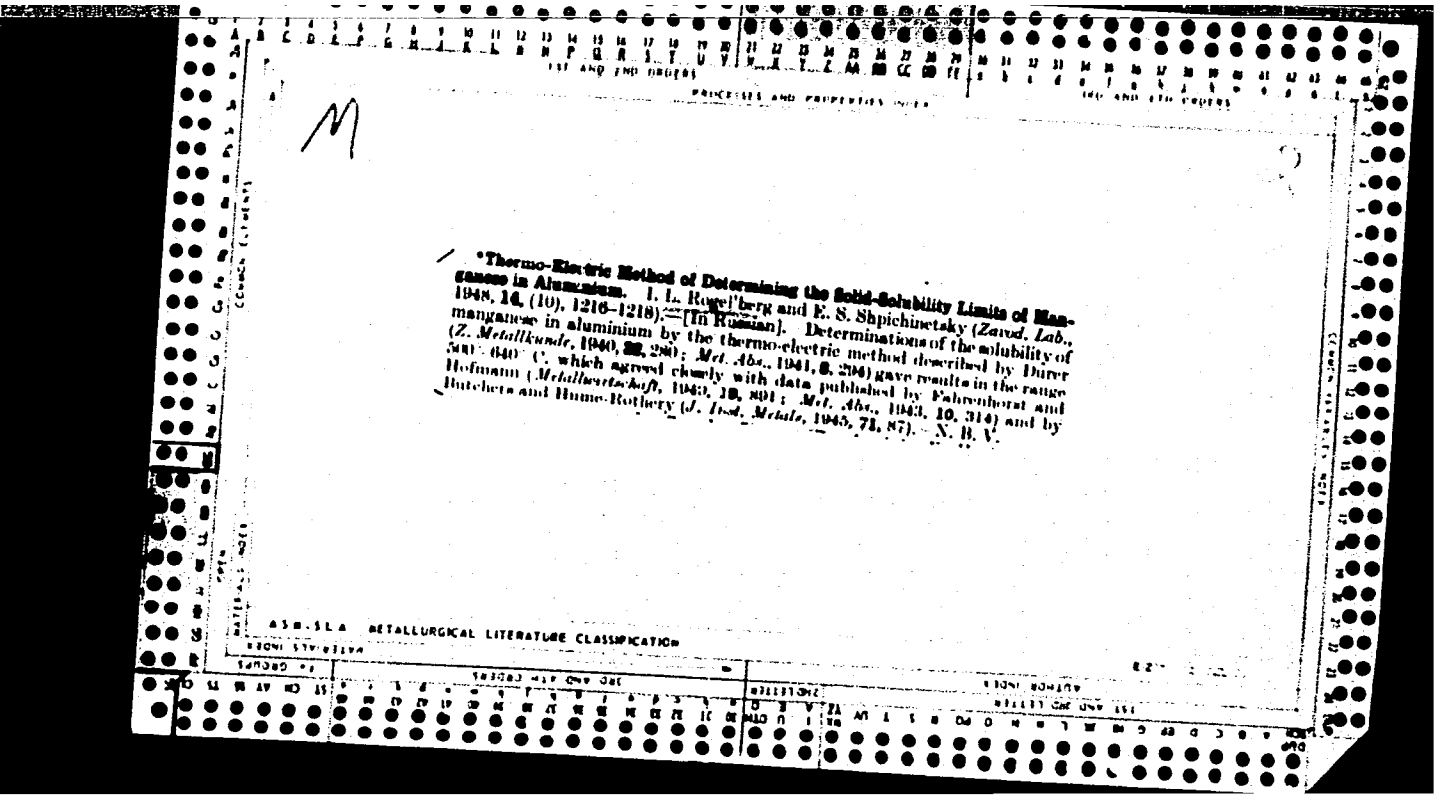


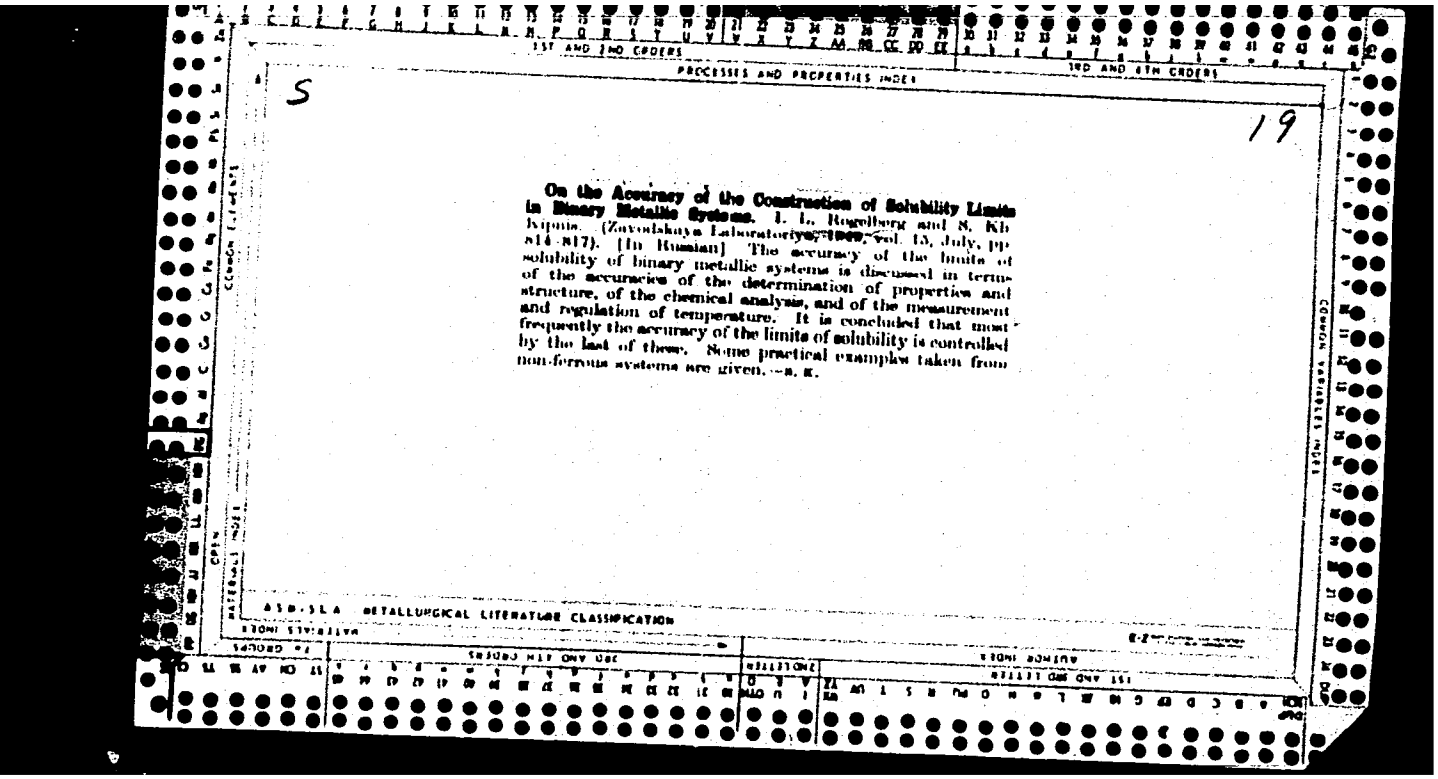
11-153. Accuracy of Determination of Limits of Solubility in Binary Metallic Systems. (In Russian.) I. L. Rogel'berg and S. Kh. Kipnis. Zavodskaya Laboratoriya (Factory Laboratory), v. 15, July 1949. p. 814-817.

Results of a thorough analysis of the various factors involved. 12 ref.



"Thermo-Electric Method of Determining the Solid-Solubility Limits of Manganese in Aluminium. I. L. Rogel'berg and E. S. Shpichinetsky (*Zavod. Lab.*, 1948, **14**, (10), 1216–1218).—[In Russian]. Determinations of the solubility of manganese in aluminium by the thermo-electric method described by Durer (*Z. Metallkunde*, 1940, **32**, 290; *Met. Abs.*, 1941, **8**, 204) gave results in the range 580–640° C, which agreed closely with data published by Fahrenhorst and Hofmann (*Metallwirtschaft*, 1942, **21**, 891; *Met. Abs.*, 1943, **10**, 314) and by Butchers and Hume-Rothery (*J. Inst. Metals*, 1945, **71**, 87). N. B. V.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

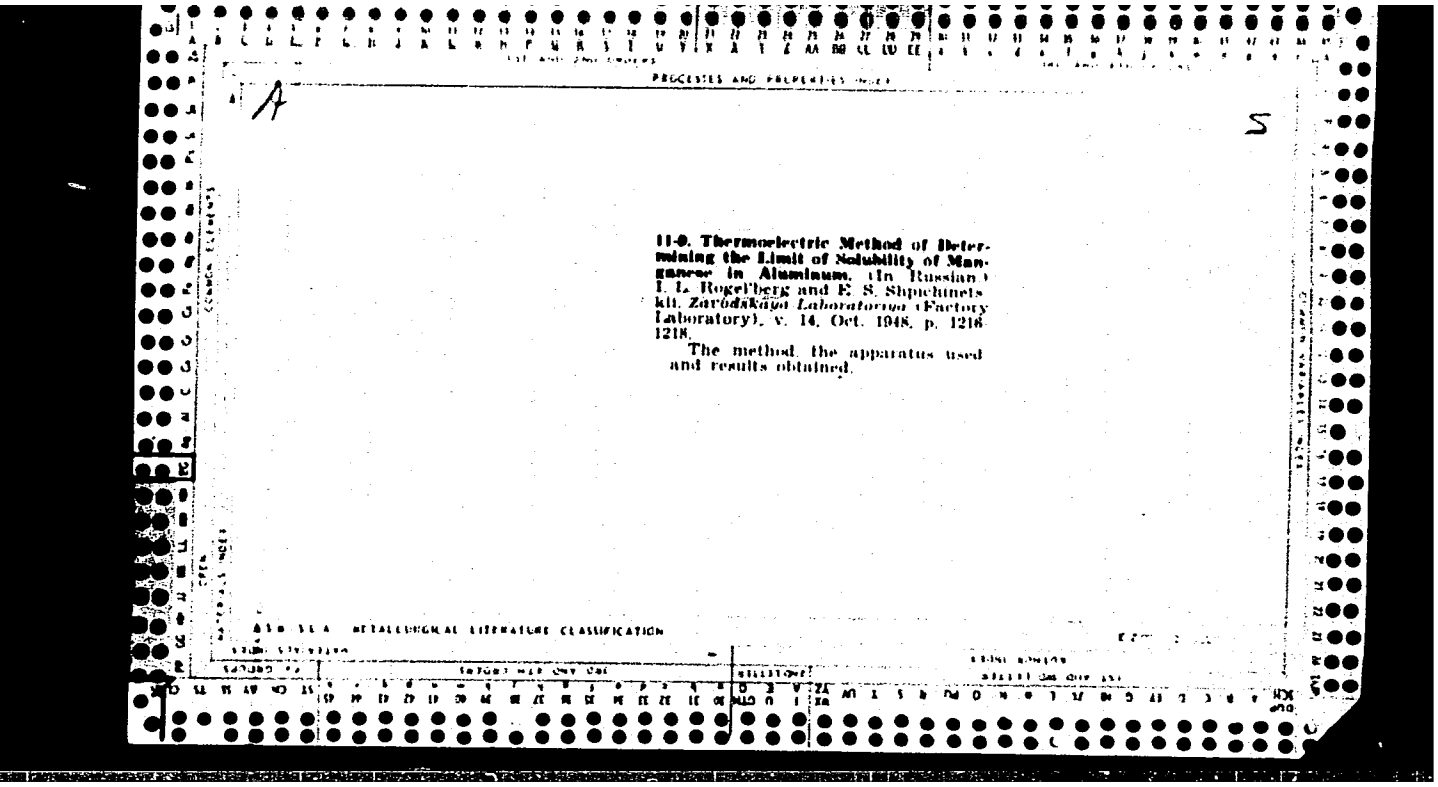
3RD AND 4TH ORDERS

S

19

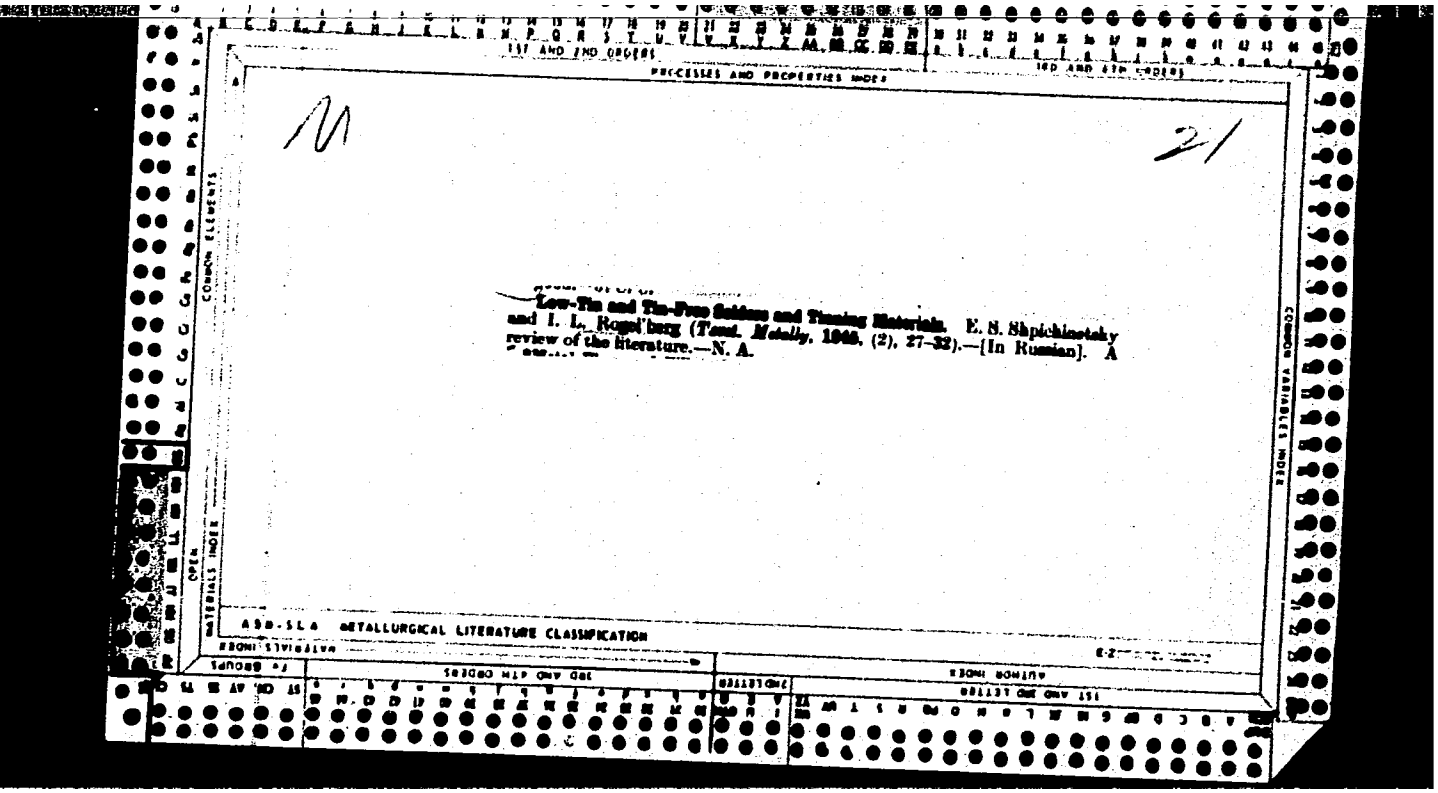
On the Accuracy of the Construction of Solubility Limits in Binary Metallic Systems. I. L. Rogelberg and S. Kh. Rapoport. (Zavodskaya Laboratoriya, 1949, Vol. 15, July, pp. 814–817). [In Russian] The accuracy of the limits of solubility of binary metallic systems is discussed in terms of the accuracies of the determination of properties and structure, of the chemical analysis, and of the measurement and regulation of temperature. It is concluded that most frequently the accuracy of the limits of solubility is controlled by the last of these. Some practical examples taken from non-ferrous systems are given.—S. K.

A50-51A METALLURGICAL LITERATURE CLASSIFICATION



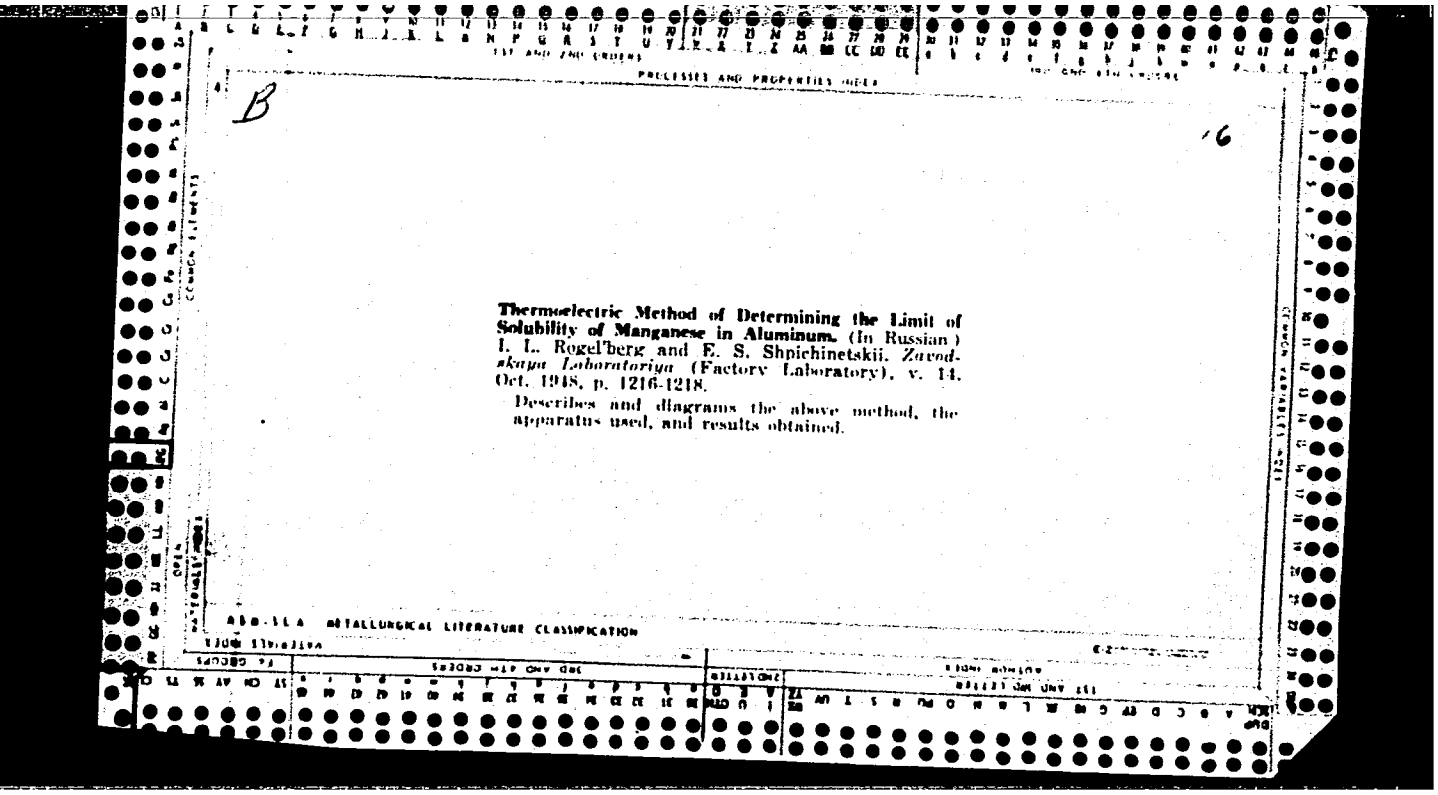
11-9. Thermoelectric Method of Determining the Limit of Solubility of Manganese in Aluminum. (In Russian) I. L. Rogel'berg and E. S. Shpichinets'kii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Oct. 1948, p. 1216-1218.

The method, the apparatus used and results obtained.



Low-Tin and Tin-Free Solders and Tinning Materials. E. S. Shpichinetsky and I. L. Rogel'berg (*Tsvet. Metally*, 1960, (2), 27–32).—[In Russian]. A review of the literature.—N. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



B

16

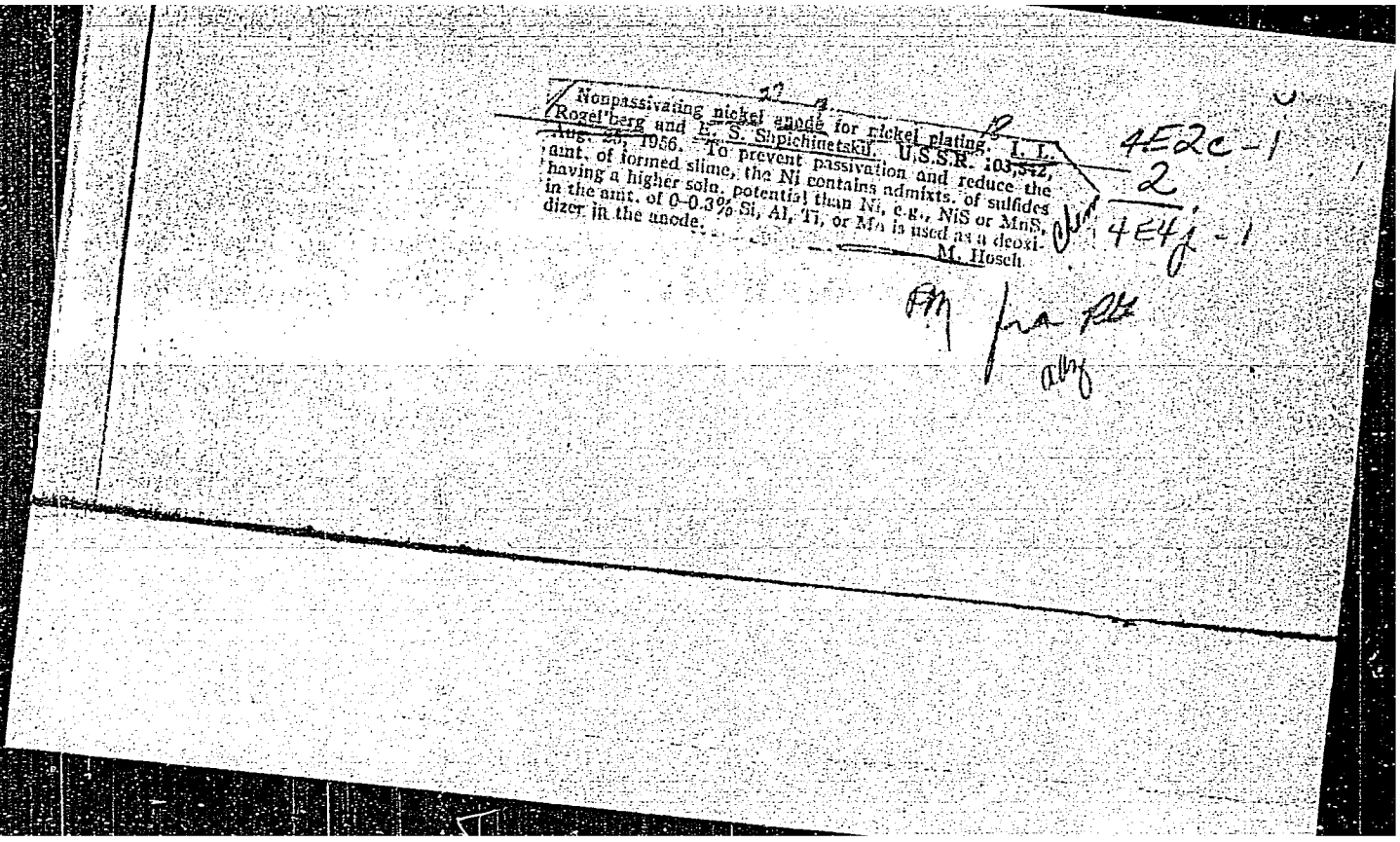
Thermoelectric Method of Determining the Limit of Solubility of Manganese in Aluminum. (In Russian) I. L. Rogel'berg and E. S. Shpichinetskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Oct. 1948, p. 1216-1218.

Describes and diagrams the above method, the apparatus used, and results obtained.

ASM-ILA METALLURGICAL LITERATURE CLASSIFICATION

ROGEL'BERG, I.L.; SHPICHINETSKIY, Ye.S.

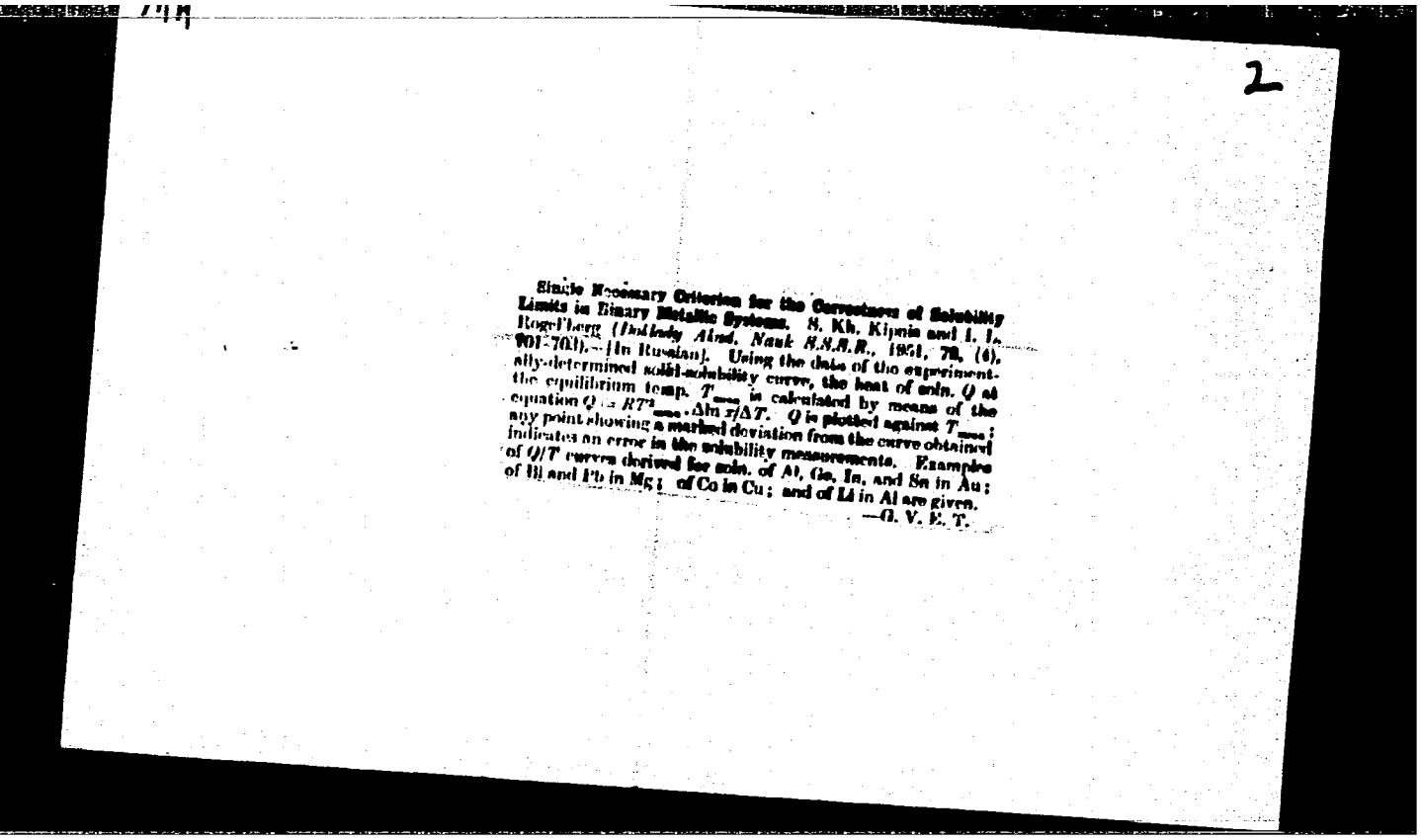
Brittleness of nickel. TSvet.met. 28 no.5:63-66 S-O '55.
(Nickel) (MIRA 10:10)



Nonpassivating nickel anode for nickel plating. I. L. Rogel'berg and L. S. Shpichinetskii. U.S.S.R. 103,542, Aug. 20, 1956. To prevent passivation and reduce the amt. of formed slime, the Ni contains admixts. of sulfides having a higher sola. potential than Ni, e.g., NiS or MnS, in the amt. of 0–0.3% Si, Al, Ti, or Mn is used as a deoxidizer in the anode.

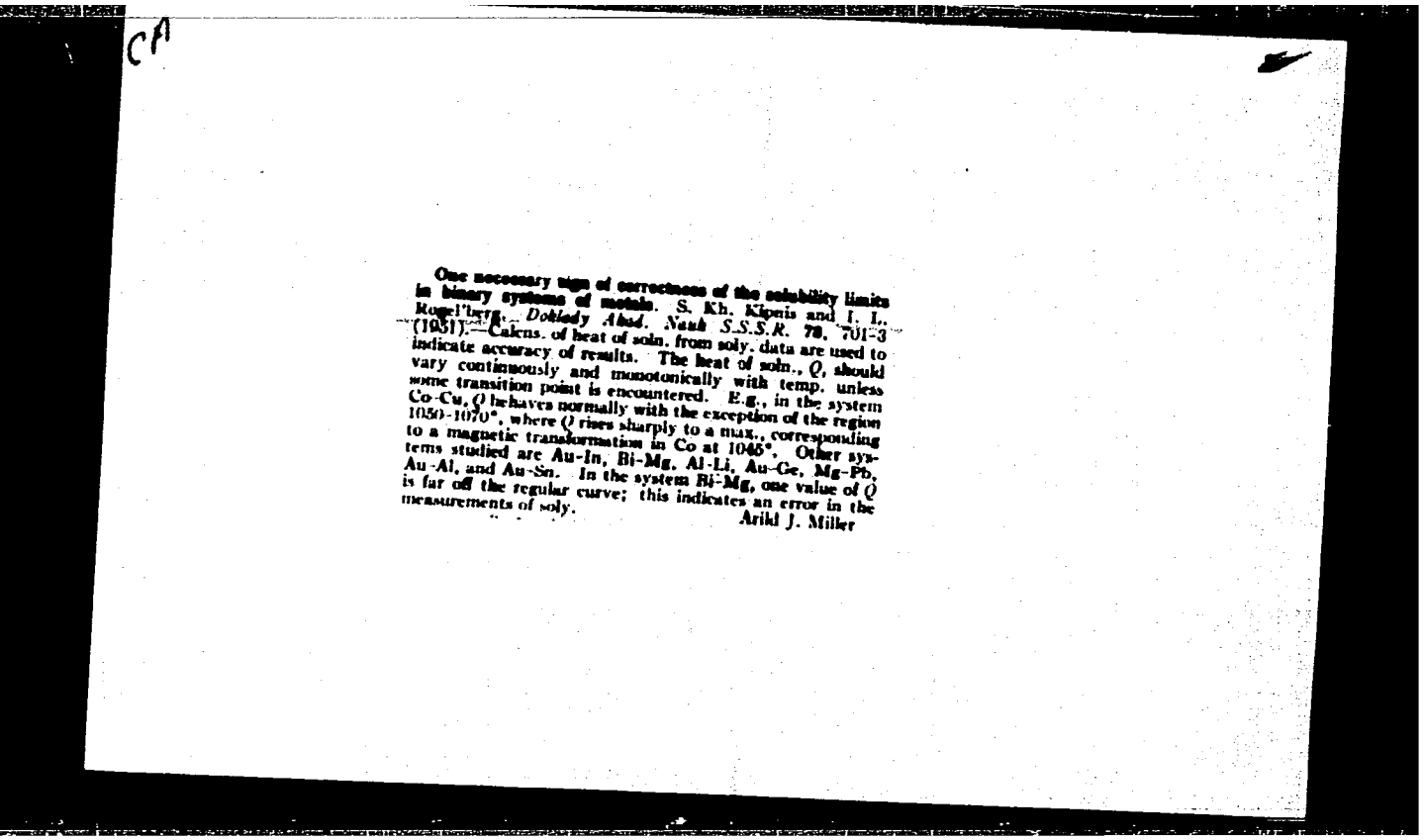
M. Hosch

4E2c-1
2
4E4f-1



2

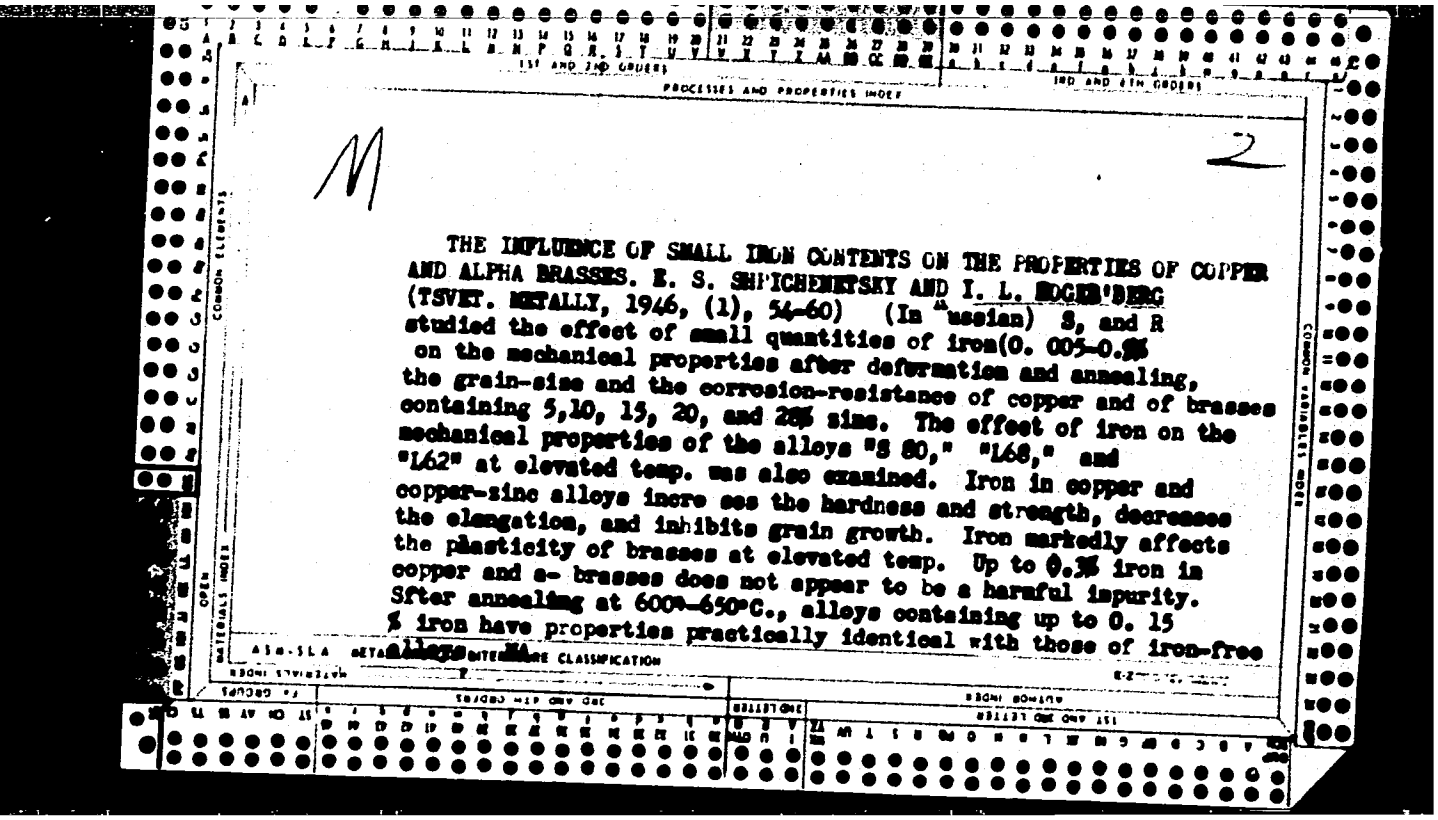
Simple Necessary Criterion for the Correctness of Solubility Limits in Binary Metallic Systems. S. Kh. Kipnis and I. I. Rogelberg (*Izdatel'stvo Akad. Nauk S.S.S.R.*, 1951, 79, (4), 701–703).—[In Russian]. Using the data of the experimentally-determined solid-solubility curve, the heat of soln. Q at the equilibrium temp. $T_{max.}$ is calculated by means of the equation $Q = RT^2_{max.} \cdot \Delta \ln x/\Delta T$. Q is plotted against $T_{max.}$; any point showing a marked deviation from the curve obtained indicates an error in the solubility measurements. Examples of Q/T curves derived for soln. of Al, Ge, In, and Sn in Au; of Bi and Pb in Mg; of Co in Cu; and of Li in Al are given.
—G. V. E. T.



CA

One necessary sign of correctness of the solubility limits in binary systems of metals. S. Kh. Kipnis and I. L. Rogel'berg. *Doklady Akad. Nauk S.S.S.R.* **79**, 701-3 (1951).—Calcns. of heat of soln. from soly. data are used to indicate accuracy of results. The heat of soln., Q, should vary continuously and monotonically with temp. unless some transition point is encountered. E.g., in the system Co-Cu, Q behaves normally with the exception of the region 1050-1070°, where Q rises sharply to a max., corresponding to a magnetic transformation in Co at 1045°. Other systems studied are Au-In, Bi-Mg, Al-Li, Au-Ge, Mg-Pb, Au-Al, and Au-Sn. In the system Bi-Mg, one value of Q is far off the regular curve; this indicates an error in the measurements of soly.

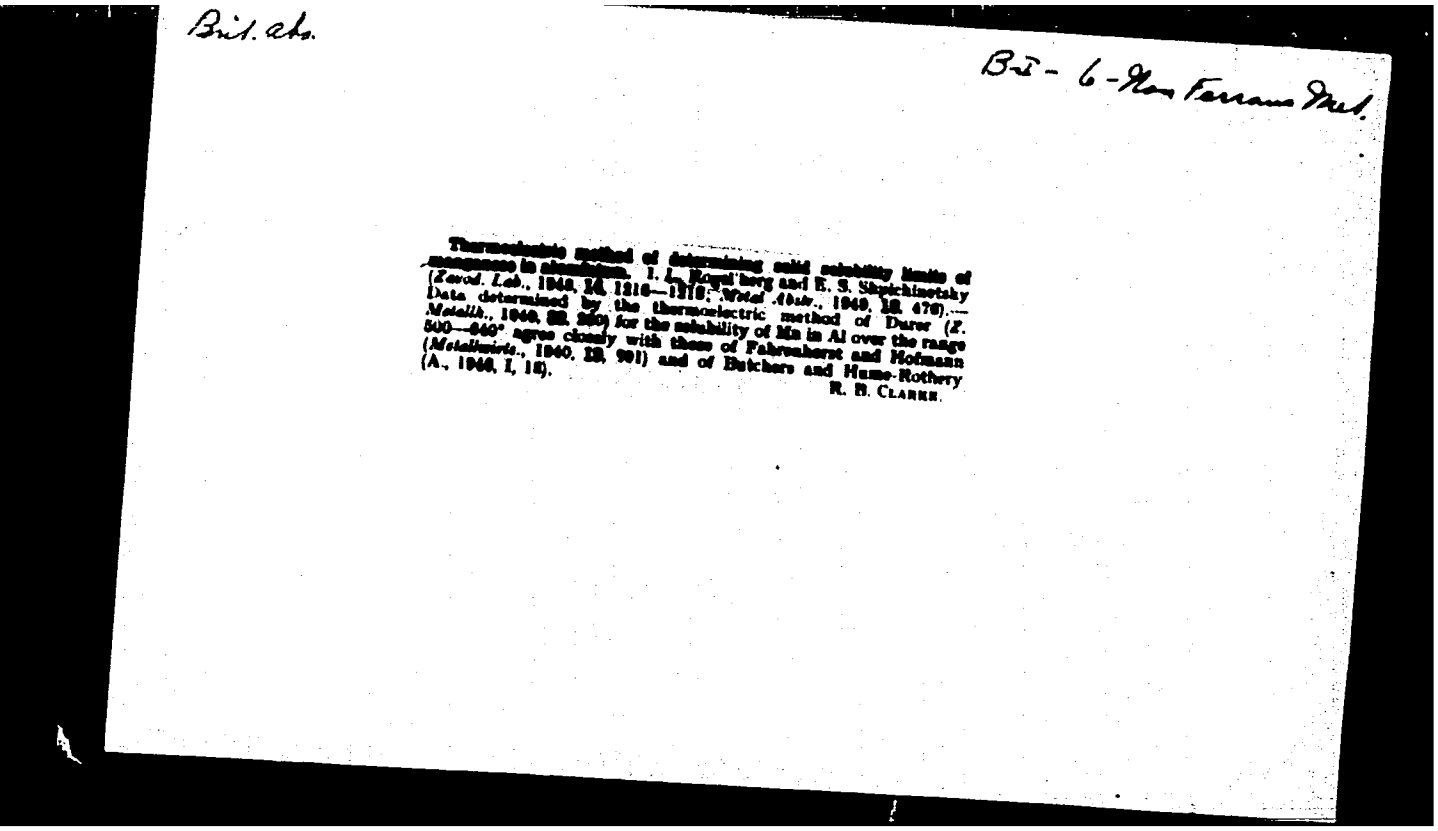
Arikl J. Miller



M

2

THE INFLUENCE OF SMALL IRON CONTENTS ON THE PROPERTIES OF COPPER AND ALPHA BRASSES. E. S. SHPICHENETSKY AND I. L. ROGEL'BERG (TSVET. METALLY, 1946, (1), 54-60) (In Russian) S, and R studied the effect of small quantities of iron(0. 005-0.5% on the mechanical properties after deformation and annealing, the grain-size and the corrosion-resistance of copper and of brasses containing 5,10, 15, 20, and 28% zinc. The effect of iron on the mechanical properties of the alloys "S 80," "L68," and "L62" at elevated temp. was also examined. Iron in copper and copper-zinc alloys increases the hardness and strength, decreases the elongation, and inhibits grain growth. Iron markedly affects the plasticity of brasses at elevated temp. Up to 0.3% iron in copper and α- brasses does not appear to be a harmful impurity. After annealing at 600°-650°C., alloys containing up to 0. 15 % iron have properties practically identical with those of iron-free

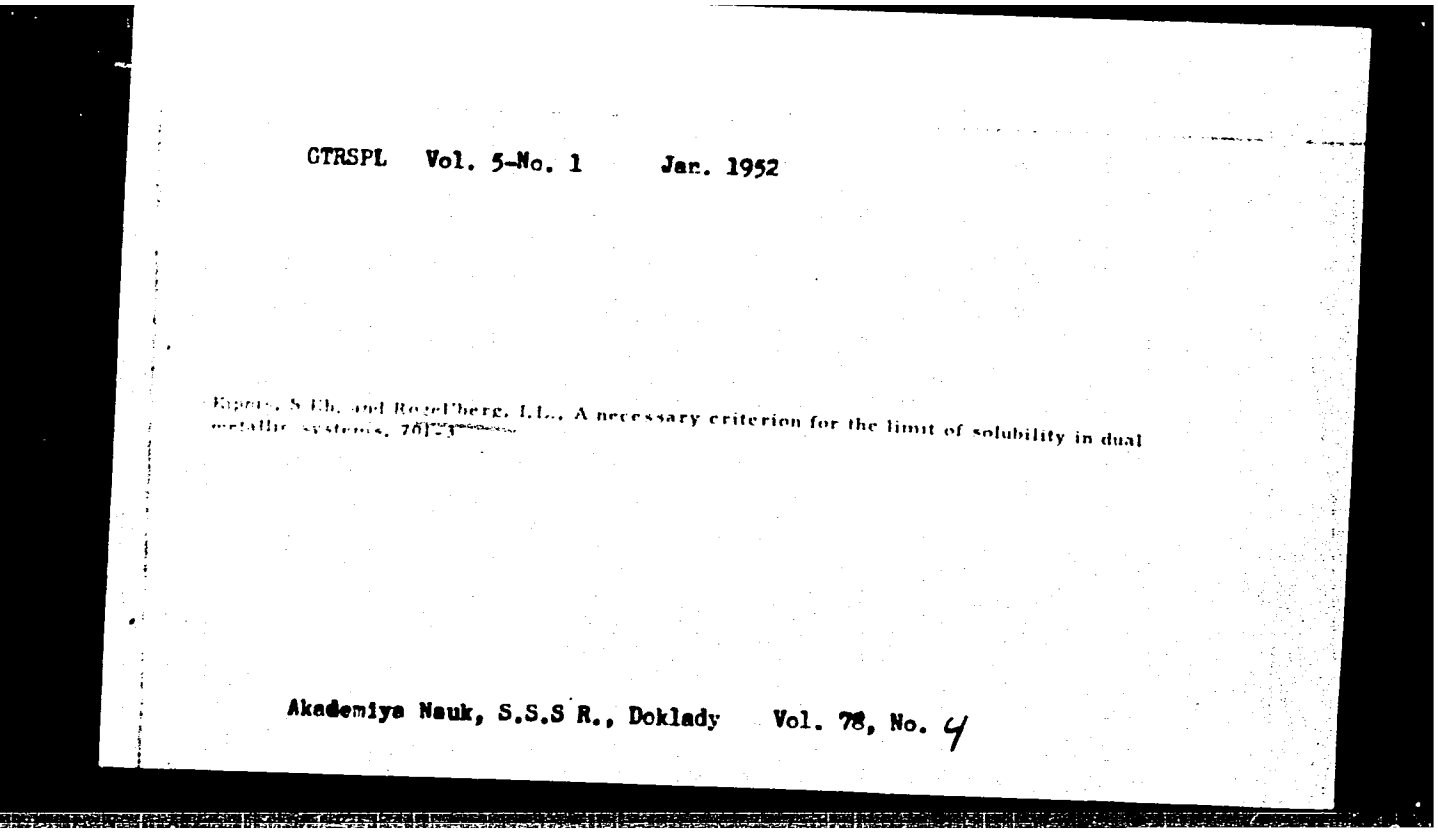


Brit. abs.

B-I - 6 - Non Ferrous Met.

Thermoelectric method of determining solid solubility limits of manganese in aluminium. I. L. Rogel'berg and E. S. Shpichinetsky (*Zavod. Lab.*, 1948, **14**, 1216—1218; *Metal. Abstr.*, 1949, **16**, 470).—Data determined by the thermoelectric method of Durer (*Z. Metallk.*, 1940, **32**, 340) for the solubility of Mn in Al over the range 500—640° agree closely with those of Fahrenhorst and Hofmann (*Metallwirts.*, 1940, **19**, 901) and of Butchers and Hume-Rothery (A., 1946, I, 18).

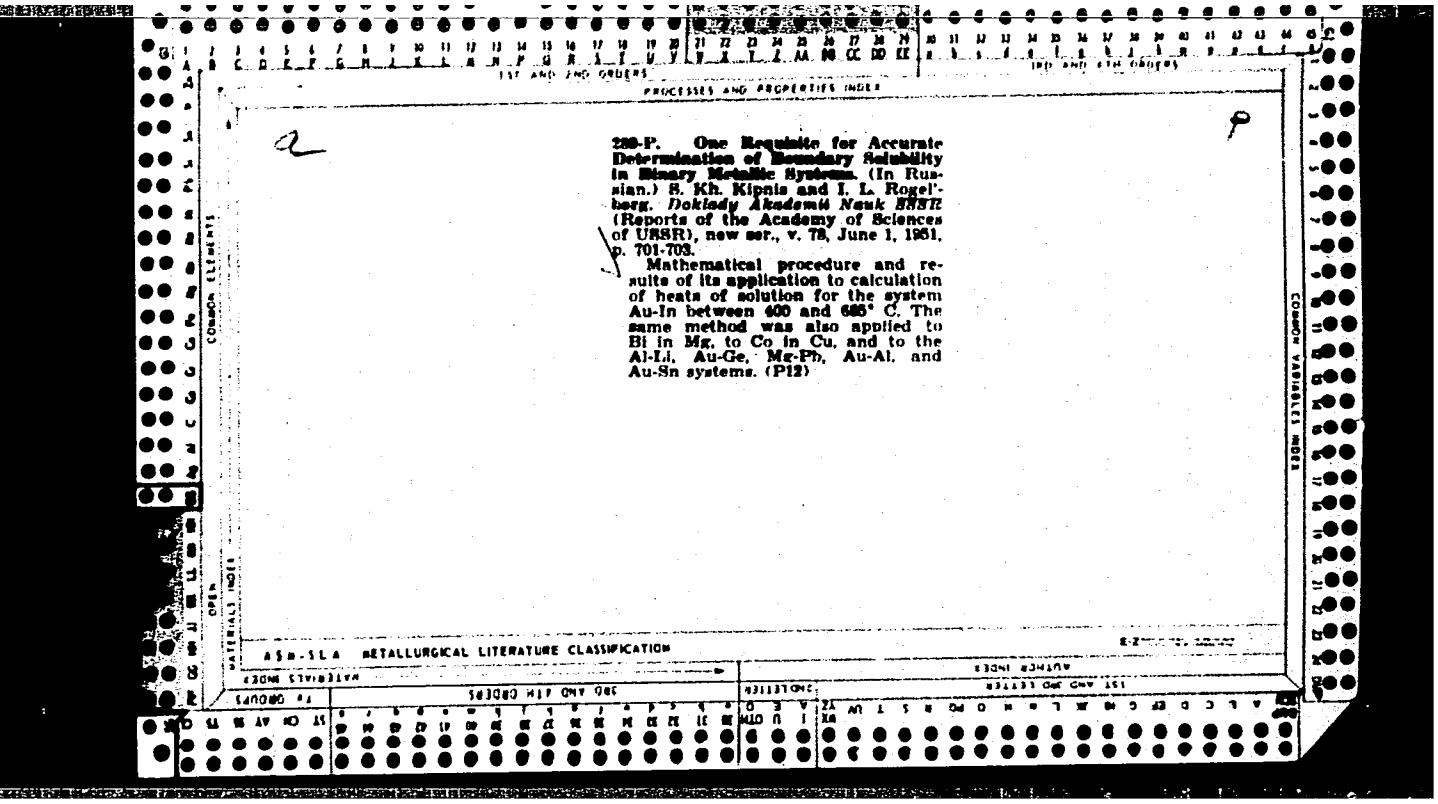
R. B. CLARKE.



GTRSPL Vol. 5-No. 1 Jan. 1952

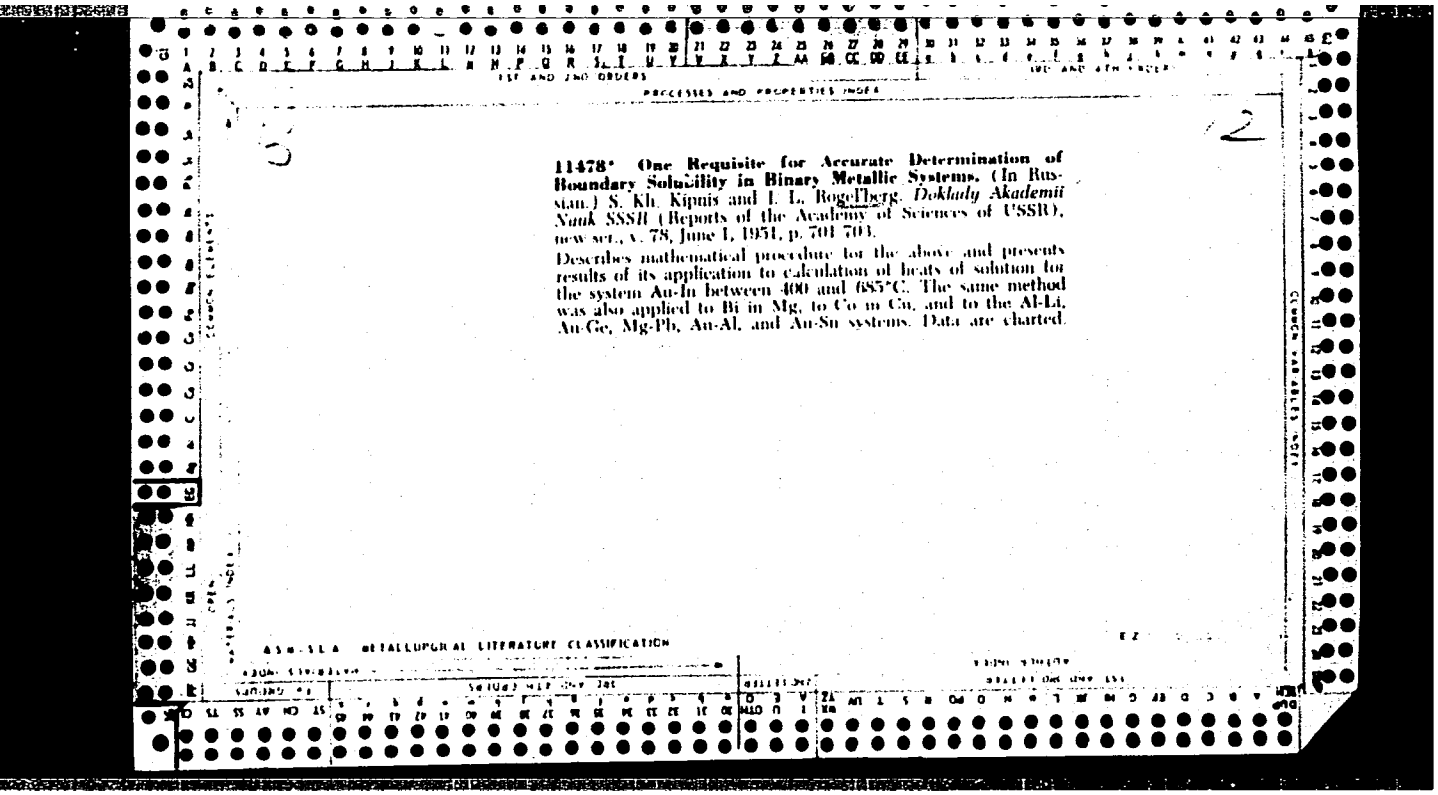
Egorov, S Eh. and Regel'berg, I.L., A necessary criterion for the limit of solubility in dual metallic systems, 76[illegible]

Akademiya Nauk, S.S.S R., Doklady Vol. 78, No. 4



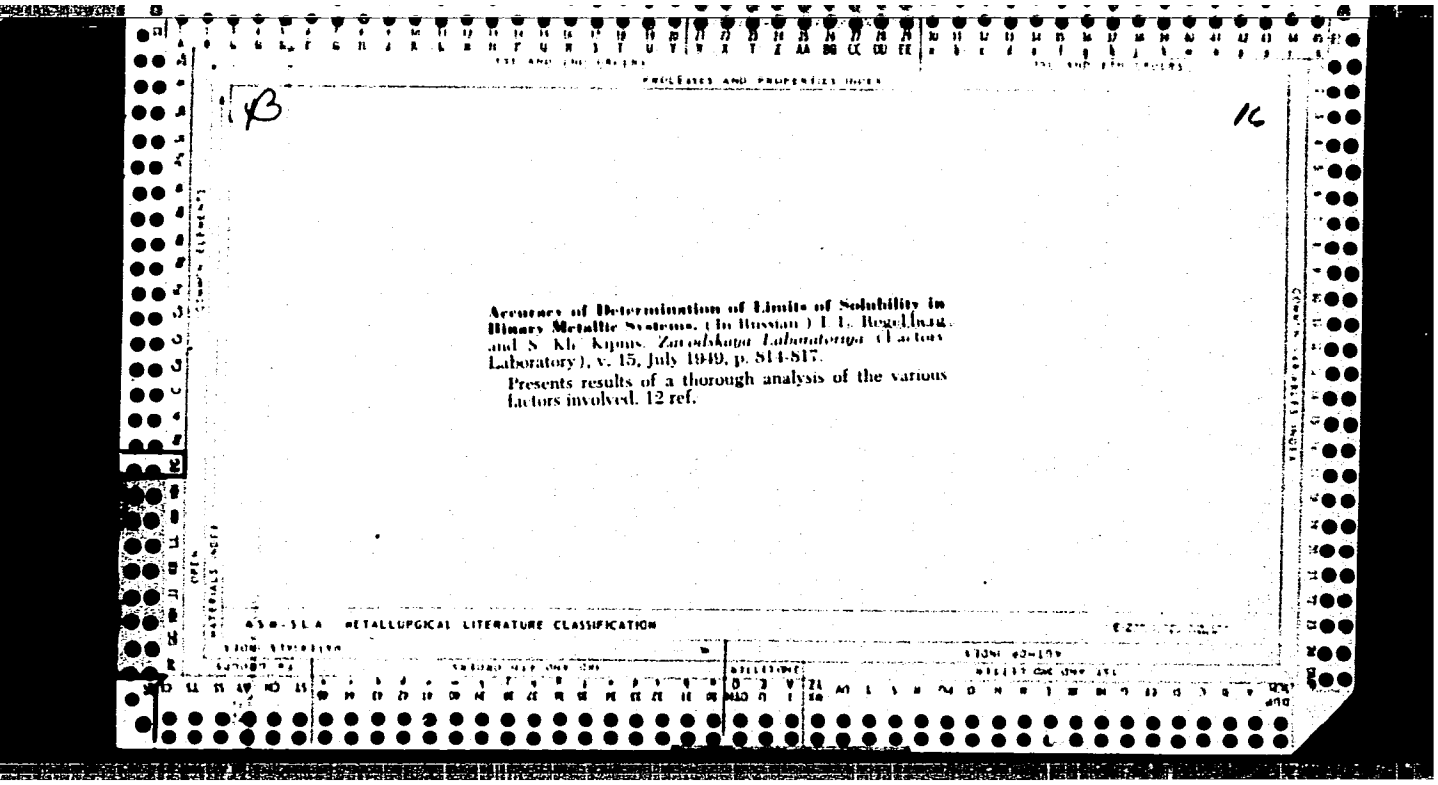
288-P. **One Requisite for Accurate Determination of Boundary Solubility in Binary Metallic Systems.** (In Russian.) S. Kh. Kipnis and I. L. Rogel'berg. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 701-703.

Mathematical procedure and results of its application to calculation of heats of solution for the system Au-In between 400 and 685° C. The same method was also applied to Bi in Mg, to Co in Cu, and to the Al-Li, Au-Ge, Mg-Pb, Au-Al, and Au-Sn systems. (P12)



11478* **One Requisite for Accurate Determination of Boundary Solubility in Binary Metallic Systems.** (In Russian.) S. Kh. Kipnis and I. L. Rogelberg. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of USSR), new ser., v. 78, June 1, 1951, p. 701-703.

Describes mathematical procedure for the above and presents results of its application to calculation of heats of solution for the system Au-In between 400 and 685°C. The same method was also applied to Bi in Mg, to Co in Cu, and to the Al-Li, Au-Ge, Mg-Pb, Au-Al, and Au-Sn systems. Data are charted.



Accuracy of Determination of Limits of Solubility in Binary Metallic Systems. (In Russian.) I. L. Rogelberg and S. Kh. Kipnis. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, July 1949, p. 814-817.

Presents results of a thorough analysis of the various factors involved. 12 ref.

SOV/149-58-6-14/19

AUTHORS: Zakharov, V.Z., Novikov, I.I., Rogel'berg, I.L. and Yao Min-chich

TITLE: Investigation of the Effect of Some Factors on the Critical Degree of Deformation of Aluminium (Issledovaniye vliyaniya nekotorykh faktorov na kriticheskuyu stepen' deformatsii alyuminiya)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, 1958, Nr 6, pp 126 - 129 (USSR)

ABSTRACT: In the first stage of the investigation, the authors studied the effect of various additions (added in quantities usually present in industrial aluminium alloys) on the critical degree of deformation of aluminium. The following alloys were used in the experiments:

Al + 0.22;	0.3 ;	0.6%	Mn
Al + 0.27;	0.36;	0.55%	Fe
Al + 0.22;	0.42;	0.53%	Si
Al + 0.24;	1.23;	2.4%	Mg
Al + 0.22;	0.92;	4.19%	Cu
Al + 0.2;	1.2;	5.8%	Zn .

Cardl/4

Investigation of The Effect of Some Factors on the Critical Degree of Deformation of Aluminium

The cast ingots 18.5 mm thick were hot-rolled to 3 mm and then cold-rolled to 1.5 mm thickness. The standard tensile test pieces prepared from the cold-rolled strip and annealed at 450 °C for 30 min were strained in tension at room temperature at the rate of strain equal approx. 15 mm/min, the degree of deformation varying between 1 and 21%. The test pieces were then annealed in a salt bath (30 min at 500 °C) after which the average grain size was determined. The relationship between the grain size (mm) of pure (99.67%) aluminium and Al-Mn alloys and the degree of preliminary deformation (%) is illustrated in Figure 1. The effect of the concentration of Mn, Fe, Si, Cu, Mg and Zn in the investigated Al alloys on the degree of critical deformation is shown in Figure 2. It was found that while Mn and, to a lesser extent, Fe caused a sharp increase in the critical degree of deformation, this property was hardly affected by the presence of the other studied elements. The results of determination of the recrystallisation temperatures and of the grain size

 measurements on specimens annealed at 300, 400, 500 and

600 °C showed that Mn and Fe (up to 0.6%) are most effective in delaying the onset of recrystallisation and in inhibiting the grain growth during annealing of deformed Al alloys. The effect of the temperature of the deformation on the critical degree of deformation was studied on standard tensile test pieces prepared from pure (99.78%) cold-rolled aluminium. The test pieces were deformed in tension at temperatures varying from 20 to 400 °C and annealed at 450 °C for 30 min, after which their grain size was determined. The results reproduced in Figure 3 in the form of a graph show that the critical degree of deformation (%) increases with increasing temperature of the deformation. In the last stage of the investigation, the Al test pieces used for determination of the effect of the deformation temperature on the critical degree of deformation were subjected to room temperature tensile tests in order to measure their elongation. Figure 4 shows the relationship between the elongation (%) of these test pieces and the degree of preliminary deformation (%) at various temperatures. It can be seen that the higher the degree of deformation in the sub-critical region the

Investigation of the Effect of Some Factors on the Critical Degree of Deformation of Aluminium SOV/149-58-6-14/19

lower is the elongation of the deformed and annealed material.
There are 4 figures and 9 references, 5 of which are Soviet, 3 German and 1 English.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota. Kafedra metallovedeniya (Moscow Institute of Non-ferrous Metals and Gold. Chair of Metal Working)

SUBMITTED: September 1, 1958

Card 4/4

L 23846-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EPR/T/EWP(t)/EWP(b) Pad/Pa-4/Pu-4 IJP(c)
ACCESSION NR: AT4045671 JD/WW/HW/JG S/2680/64/000/022/0039/0061

AUTHOR: Agafonov, A. K.; Aleksakhin, I. A.; Pokrovskaya, G. N.; Puchkov, B. I.; Rogel'berg, I. L.; Tarasova, T. F.; Muzhnov, A.G. (Deceased)

TITLE: Thermoelectromotive force of binary solid solutions on a Ni-base

SOURCE: Moscow. Gosudarstvenny*y nauchno-issledovatel'skiy i proyektny*y institut splavov i obrabotki tsvetny*kh metallov. Trudy*, no. 22, 1964. Issledovaniye splavov dlya termopar (Studying alloys for thermocouples), 39-61

TOPIC TAGS: thermoelectromotive property, binary solid solution, nickel, aluminum, beryllium, cobalt, chromium, copper, iron, germanium, magnesium, manganese, molybdenum, niobium, rhenium, silicon, tantalum, titanium, vanadium, tungsten, zirconium, oxidation resistance

ABSTRACT: Many alloys used for the production of thermocouples have a Ni base and, therefore, their thermoelectric properties are of considerable interest. Ni alloys with Al, Be, Co, Cr, Cu, Fe, Ge, Mg, Mn, Mo, Nb, Re, Si, Ta, Ti,

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L 23816-65
ACCESSION NR: AT4045671

4

V^{27}, W^{27} and Zr^{27} were tested. Specimens consisted of 300 g ingots having a diameter of 18 mm. An argon induction furnace was used and a magnesite crucible. Ingots with a low content of additives were cold-rolled into 5.3 mm rods and cold-roll specimens with a high content of the second component were subjected to intermediate quenching from 1200C. The rods were annealed for two hours at 1000C and the thermoelectromotive force measured within a temperature range of 0 to 1200C. Most tested elements enhanced the thermoelectromotive force of Ni and 15 to 17% Mo, 6.5% Co and 19 to 20% W had a conspicuous effect. Elevated temperature accelerated the effect and low temperature slowed it down considerably. The only exceptions were Al, Be and Cu: these elements lowered the thermoelectromotive force. Many systems displayed an extremum in solid solutions with Cr, Co, Al, Si, Co, etc. Orig. art. has: 36 figures and 3 tables

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut obrabotki tsvetnykh metallov, Moscow (State Scientific Research and Planning Institute for the Processing of Nonferrous Metals)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM, EM

NR REF SOV: 008 OTHER: 009

Card 2/2

PUCHKOV, B.I.; RAKHSHTADT, A.G.; ROGEL'BERG, I.L.; GAVZE, A.L.

Hardening of copper-nickel alloys during recrystallization annealing and recovery during repeated deformation. Metalloved. i term. obr. met. no.3:17-22 Mr '65. (MIRA 18:10)

1. Moskovskoye vysshaya tekhnicheskoye uchilishche im. Baumana i Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov.

PASTUKHOVA, Zh.P.; IVANOVA, T.V.; PUCHKOV, B.I.; RAKHSHTADT, A.G.; ROGEL'BERG, I.L.

Effect of additions alloys on the properties of aluminum bronze. Metalloved. i term. obr. met. no.3:22-28 Mr '65.
(MIRA 18:10)

1. Moskovskoye vyssheye tekhnicheskoye uchilishche im. Baumana i Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov.

L 60216-65 EWT(d)/EWT(l)/EWT(m)/EPF(n)-2/EWA(d)/EWP(v)/EPR/EWP(t)/EWP(k)/EWP(h)/EWP(b)/EWP(l)/EWA(h) Pz-6/Pf-4/Ps-4/Peb/Pu-4 IJP(c) JD/WW/JG/AT

ACCESSION NR: AP5019064 UR/0286/65/000/012/0089/0089

AUTHORS: Gil'dengorn, I. S.; Nuzhnov, A. G.; Pigidina, E. M.; Pokrovskaya, G. N.; Puchkov, B. I.; Rogel'berg, I. L.; Tarasova, T. F.

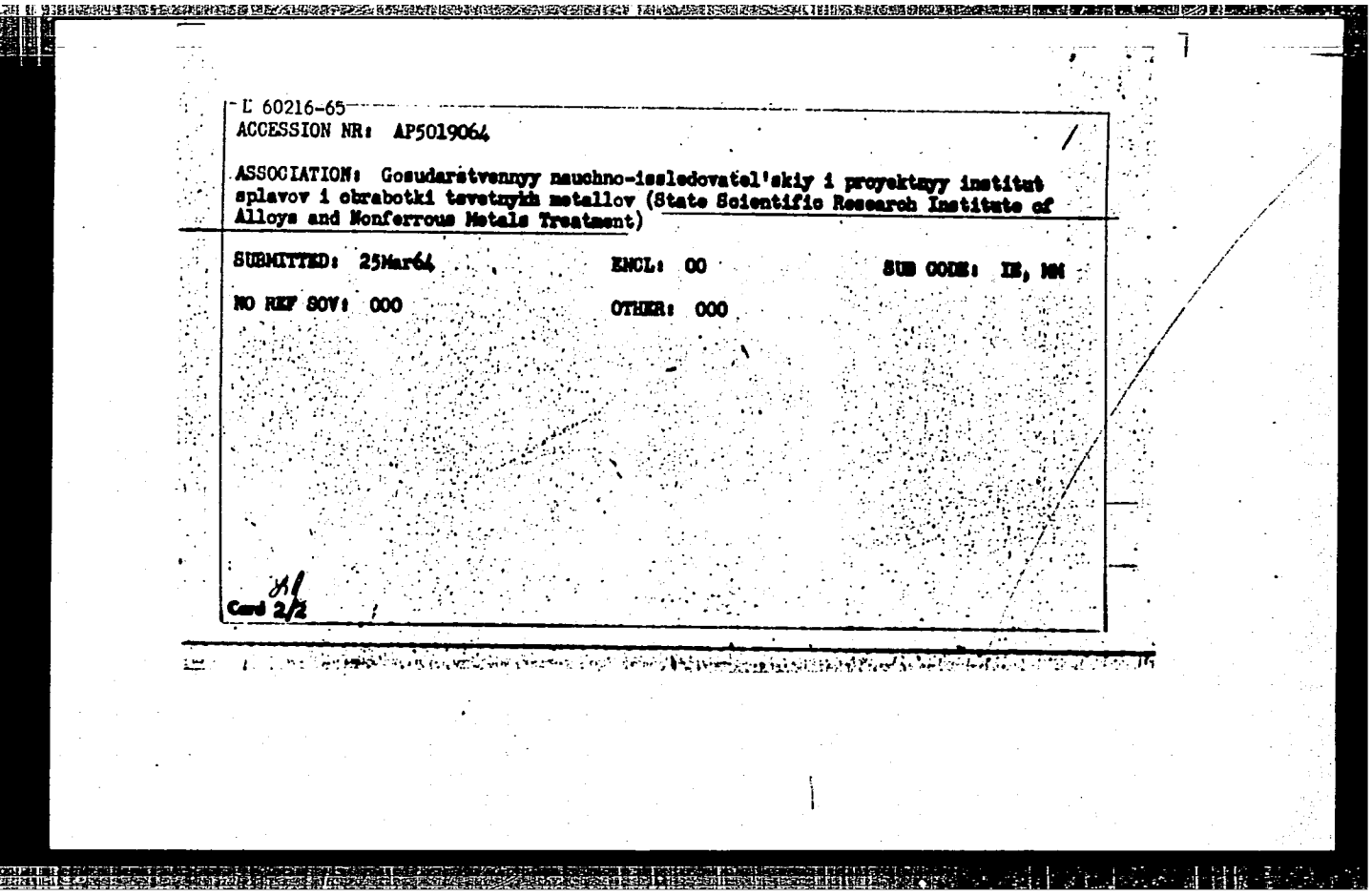
TITLE: Thermocouple. Class 21, No. 172087

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 12, 1965, 89

TOPIC TAGS: thermocouple, precious metal, oxidizing medium, nickel, silicon, niobium, cobalt, manganese, carbon, magnesium, zirconium, calcium, lanthanum, cerium, boron, electrode

ABSTRACT: This Author Certificate presents a thermocouple based on precious metals and intended for use in oxidizing media. To increase its longevity at temperatures up to 1300C, the negative electrode is made of nickel with 2.5-7.0% of silicon and 1.5-5.0% of aluminum, while the positive electrode is made of a nickel alloy with 8-11% of chromium and 2-4% of silicon. Silicon may be fully or completely replaced by niobium. The electrode alloys may also be augmented with (singly or jointly) cobalt and manganese (up to 1%), zirconium (up to 0.2%), carbon and magnesium (up to 0.15%), calcium and lanthanum (up to 0.1%), cerium and boron (up to 0.01%).

Card 1/2



L 60216-65
ACCESSION NR: AP5019064

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov (State Scientific Research Institute of Alloys and Nonferrous Metals Treatment)

SUBMITTED: 25Mar64 ENCL: 00 SUB CODE: IE, MM

NO REF SOV: 000 OTHER: 000

Card 2/2

GIL'DENGORN, I.S.; ROGEL'BERG, I.L.

Investigating the oxidation of nickel-silicon-aluminum alloys at high temperatures. Fiz. met. i metalloved. 20 no.2:231-235 Ag '65. (MIRA 18:9)

1. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov.

EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) MJW/JD

ACC NR: AP5028961 SOURCE CODE: UR/0119/65/000/009/0017/0020

AUTHOR: Mishkevich, R. I. (Candidate of technical sciences); Puchkov, B. I. (Engineer); Rakhshtadt, A. G. (Doctor of technical sciences); Rogel'berg, I. L. (Candidate of technical sciences)

ORG: none

TITLE: Relaxation resistance of spring alloys

SOURCE: Priborostroyeniye, no. 9, 1965, 17-20

TOPIC TAGS: stress relaxation, brass, bronze, copper base alloy, annealing, metal test

ABSTRACT: The results of an experimental investigation of the relaxation resistance of copper-base alloys under stress and after low-temperature annealing are reported; the alloys were tested at room temperature and heated up to 100—200C. Ribbons 0,25—0.30-mm thick of these brasses and bronzes were tested: L62, L85, L80, L68, Br.OF6,5-0,15, Br.OF4-0,25, Br.OTs.4-3, Br.A7, Br.KMTs 3-1, MNTs 15-20. Test curves and tabulated data permit drawing these conclusions: (1) Stress relaxation of principal copper-base alloys used in instruments was

Card 1/2

UDC: 620.17:62.272:669.35

L 11545-66

ACC NR: AP5028961

determined at 20C for 50000 hrs and at 100--200C for 300 hrs; (2) Low-temperature annealing of all alloys except Br.OF4-0,25 bronze materially enhances the relaxation resistance at 20C; the highest relaxation resistance was found in Br.KMTs 3-1, Br.OTs.4-3, and nickel silver; (3) The low-temperature annealing also enhances the relaxation resistance of hot alloys; (4) The MNTs 15-20 alloy exhibited a highest relaxation resistance with and without the low-temperature annealing; other alloys are unfit for using in springs that work at higher temperatures. Orig. art. has: 8 figures and 2 tables.

SUB CODE: 11 / SUBM DATE: none / ORIG REF: 001

HW

Card 2/2